Appendix E. Integrated Pest Management Program

E.1 Background

Integrated Pest Management (IPM) is an interdisciplinary approach utilizing methods to prevent, eliminate, contain, and/or control pest species in concert with other management activities on refuge lands and waters to achieve wildlife and habitat management goals and objectives. It is also a scientifically-based, adaptive management process where available scientific information and the best professional judgment of the refuge staff as well as other resource experts would be used to identify appropriate management strategies that can be modified and/or changed over time for effective, site-specific management of pest species. After a pest population threshold is determined, considering the achievement of resource objectives and the ecology of pest species, one or more methods or combinations thereof would be selected that are feasible, efficacious, and protective of non-target resources, including native species (fish, wildlife, and plants) and Service personnel, Service-authorized agents, volunteers, and the public. Staff time and available funding would be considered when determining the feasibility/practicality of various treatments.

The IPM techniques to address pests are presented as CCP strategies in an adaptive management context to achieve refuge resource objectives. In order to satisfy requirements for IPM planning as identified in the Director's Memo (dated September 9, 2004) entitled *Integrated Pest Management Plans and Pesticide Use Proposals: Updates,Guidance, and an Online Database,* the following elements of an IPM program have been incorporated into this CCP.

- Habitat and/or wildlife objectives that identify pest species and appropriate thresholds to indicate the need for and successful implementation of IPM techniques; and
- Monitoring before and/or after treatment to assess progress toward achieving objectives including pest thresholds.

Where pesticides would be necessary to address pests, this Appendix provides a structured procedure to evaluate potential effects of proposed uses involving ground-based applications to refuge biological resources and environmental quality in accordance with effects analyses presented in Chapter 6 (Environmental Effects) of the Draft CCP (2010). Only pesticide uses that likely would cause minor, temporary, or localized effects to refuge biological resources and environmental quality with appropriate best management practices (BMPs), where necessary, would be allowed for use on the refuge.

This Appendix does not describe the more detailed process to evaluate potential effects associated with aerial applications of pesticides. Moreover, it does not address effects of mosquito control with pesticides (larvicides, pupacides, or adulticides) based upon identified human health threats and the presence of disease-carrying mosquitoes in sufficient numbers from monitoring conducted on a refuge. However, the basic framework to assess potential effects to refuge biological resources and environmental quality from aerial application of pesticides or use of insecticides for mosquito management would be similar to the process described in this Appendix for ground-based treatments of other pesticides.

E.2 Pest Management Policies

In accordance with Service policy 7 RM 14 (Pest Control), wildlife and plant pests on units of the National Wildlife Refuge System can be controlled to assure balanced wildlife and fish populations in support of refuge-specific wildlife and habitat management objectives. Pest control on Federal (refuge) lands and waters also is authorized under the following legal mandates:

- National Wildlife Refuge System Administration Act of 1966, as amended (16 USC 668dd-668ee);
- Plant Protection Act of 2000 (7 USC 7701 *et seq*.);
- Noxious Weed Control and Eradication Act of 2004 (7 USC 7781-7786, Subtitle E);
- Federal Insecticide, Fungicide, and Rodenticide Act of 1996 (7 USC 136-136y);
- National Invasive Species Act of 1996 (16 USC 4701);
- Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 (16 USC 4701);
- Food Quality Protection Act of 1996 (7 USC 136);
- Executive Order 13148, Section 601(a);
- Executive Order 13112; and
- Animal Damage Control Act of 1931 (7 USC 426-426c, 46 Stat. 1468).

Pests are defined as "…living organisms that may interfere with the site-specific purposes, operations, or management objectives or that jeopardize human health or safety" from Department policy 517 DM 1 (Integrated Pest Management Policy). Similarly, this policy defines an invasive species as "a species that is non-native to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health." Throughout the remainder of this CCP, the terms pest and invasive species are used interchangeably because they both can prevent/impede achievement of refuge wildlife and habitat objectives and/or degrade environmental quality.

In general, control of pests (vertebrate or invertebrate) on the refuge would conserve and protect the nation's fish, wildlife, and plant resources as well as maintain environmental quality. From 7 RM 14, animal or plant species which are considered pests may be managed if the following criteria are met:

- Threat to human health and well-being or private property, the acceptable level of damage by the pest has been exceeded, or State or local government has designated the pest as noxious;
- Detrimental to resource objectives as specified in a refuge resource management plan (e.g., comprehensive conservation plan, habitat management plan), if available; and
- Control would not conflict with attainment of resource objectives or the purposes for which the refuge was established.

From 7 RM 14, the specific justifications for pest management activities on the refuge are the following:

- Protect human health and well being;
- Prevent substantial damage to important to refuge resources;
- Protect newly introduced or re-established native species;
- Control nonnative (exotic) species in order to support existence of populations of native species;
- Prevent damage to private property; and
- Provide the public with quality, compatible, wildlife-dependent recreational opportunities.

Based upon 50 CFR 31.14 (Official Animal Control Operations), animal species which are surplus or detrimental to the management program of a refuge area may be taken in accordance with Federal and state laws and regulations by Federal or state personnel or by permit issued to private individuals. In addition, animal species which are damaging or destroying Federal property within a refuge area may be taken or destroyed by Federal personnel. Within 7 RM15.3, the following are more specific justifications for management of furbearing animals using trapping on a refuge:

- "To maintain furbearer populations at levels compatible with refuge and surrounding habitat and with refuge objectives, which may involve habitat manipulations.
- To contribute to the attainment of national migratory bird, mammal, nonmigratory bird, and endangered species objectives or goals.
- To minimize furbearer damage to physical facilities (e.g., dikes and water control structures).

- To minimize competition with or interaction among wildlife populations and species that conflict with refuge objectives.
- To minimize the occurrence of high population densities, which have the potential to transmit contagious diseases [to] humans, among furbearer populations, or other wildlife species, or domestic animals.
- To provide authorized individuals with quality, wildlife-oriented recreational experiences, education opportunities, and opportunities to utilize a renewable natural resource."

Animal species damaging/destroying federal property and/or detrimental to the management program of a refuge may be controlled as described in 50 CFR 31.14 (Official Animal Control Operations). Based upon 7 RM 14.7E, a pest control proposal is required, in some cases, to initiate a control program on refuge lands. The required elements of a pest control proposal are described in 7 RM 14.7E. However, a pest control proposal is not required under the following scenarios:

- Routine protection of refuge buildings, structures (e.g., dikes, levees, water control structures), and facilities not involving prohibited chemicals.
- Incidental control of exotic (e.g., non-native rats, non-native rabbits) or feral animals on refuge lands that are not protected by either federal or state laws, except where chemicals may be used.
- The use of routine habitat management techniques, selective trapping, on-refuge transfer, and physical and mechanical protection such as barriers and fences (including electric fences).

For example, the incidental removal of beavers damaging refuge infrastructure (e.g., clogging with subsequent damaging of water control structures) and/or negatively affecting habitats (e.g., removing woody species from existing or restored riparian areas) managed on refuge lands may be conducted without a pest control proposal. We recognize beavers are native species and most of their activities on refuge lands represent a natural process beneficial for maintaining wetland habitats. Exotic nutria, whose denning and burrowing activities in wetland dikes cause cave-ins and breaches, can be controlled using the most effective techniques considering site-specific factors without a pest control proposal. Along with the loss of quality wetland habitats associated with breaching of impoundments, the safety of refuge staffs and the public (e.g., auto tour routes) driving on structurally compromised levees and dikes can be threatened by sudden and unexpected cave-ins.

Trespassing and feral animals also may be controlled on refuge lands. In accordance with 7 RM 14.9B(1), animals trespassing on refuge lands may be captured and returned to their owners or transferred to humane societies or local animal shelters, where feasible. Based upon 50 CFR 28.43 (Destruction of Dogs and Cats), dogs and cats running at large on a national wildlife refuge and observed in the act of killing, injuring, harassing, or molesting humans or wildlife may be disposed of in the interest of public safety and protection of wildlife. In accordance with 7 RM 14.9B(2), feral animals should be dispatched by the most humane method(s) available and in accordance with relevant Service directives (including Executive Order 11643).

Dispatched wildlife specimens may be donated or loaned to public institutions. Donation or loans of resident wildlife species will only be made after securing state approval (50 CFR 30.11 [Donation and Loan of Wildlife Specimens]). Surplus wildlife specimens may be sold alive or butchered, dressed, and processed subject to Federal and State laws and regulations (50 CFR 30.12 [Sale of Wildlife Specimens]).

As previously stated for controlling animals that are damaging/destroying federal property and/or detrimental to the management program of a refuge, incidentally removing such animals from refuge lands does not require a pest control proposal.

In accordance with Service policy 620 FW 1 (Habitat Management Plans), there are additional management directives regarding invasive species found on the refuge:

- "We are prohibited by Executive Order, law, and policy from authorizing, funding, or carrying out actions that are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere."
- "Manage invasive species to improve or stabilize biotic communities to minimize unacceptable change to ecosystem structure and function and prevent new and expanded infestations of invasive species. Conduct refuge habitat management activities to prevent, control, or eradicate invasive species..."

E.3 Strategies

To fully embrace IPM, the following strategies, where applicable, would be carefully considered on the refuge for each pest species:

E.3.1 Prevention

This would be the most effective and least expensive long-term management option for pests. It encompasses methods to prevent new introductions or the spread of the established pests to infested areas. It requires identifying potential routes of invasion to reduce the likelihood of infestation. Hazard Analysis and Critical Control Points (HACCP) planning can be used to determine if current management activities on a refuge may introduce and/or spread invasive species in order to identify appropriate BMPs for prevention. See http://www.haccp-nrm.org/ for more information about HACCP planning.

Prevention may include source reduction, using pathogen-free or weed-free seeds or fill; exclusion methods (e.g., barriers); and/or sanitation methods (e.g., wash stations) to prevent reintroductions by various mechanisms including vehicles, personnel, livestock, and horses. Because invasive species are frequently the first to establish in newly disturbed sites, prevention would require a reporting mechanism for early detection of new pest occurrences with quick response to eliminate any new satellite pest populations. Prevention would require consideration of the scale and scope of land management activities that may promote pest establishment within uninfested areas or promote reproduction and spread of existing populations. Along with preventing initial introduction, prevention would involve halting the spread of existing infestations to new sites (Mullin et al. 2000). The primary reason of prevention would be to keep pest-free lands or waters from becoming infested. Executive Order 11312 emphasizes the priority for prevention with respect to managing pests.

The following would be methods to prevent the introduction and/or spread of pests on refuge lands:

- Before beginning ground-disturbing activities (e.g., disking, scraping), inventory and prioritize pest infestations in project operating areas and along access routes. Refuge staff would identify pest species on site or within reasonably expected potential invasion vicinity. Where possible, the refuge staff would begin project activities in uninfested areas before working in pest-infested areas.
- The refuge staff would locate and use pest-free project staging areas. They would avoid or minimize travel through pest-infested areas, or restrict to those periods when spread of seed or propagules of invasive plants would be least likely.

- The refuge staff would determine the need for, and when appropriate, identify sanitation sites where equipment can be cleaned of pests. The refuge staff would clean equipment before entering lands at on-refuge approved cleaning site(s). This practice does not pertain to vehicles traveling frequently in and out of the project area that will remain on roadways. Seeds and plant parts of pest plants would need to be collected, where practical. The refuge staff would remove mud, dirt, and plant parts from project equipment before moving it into a project area.
- The refuge staff would clean all equipment before leaving the project site, if operating in areas infested with pests. The refuge staff would determine the need for, and when appropriate, identify sanitation sites where equipment can be cleaned.
- Refuge staffs, their authorized agents, and refuge volunteers would, where possible, inspect, remove, and properly dispose of seeds and parts of invasive plants found on their clothing and equipment. Proper disposal means bagging the seeds and plant parts and then properly discarding them (e.g., incinerating).
- The refuge staff would evaluate options, including closure, to restrict the traffic on sites with on-going restoration of desired vegetation. The refuge staff would revegetate disturbed soil (except travel ways on surfaced projects) to optimize plant establishment for each specific site. Revegetation may include topsoil replacement, planting, seeding, fertilization, liming, and weed-free mulching as necessary. The refuge staff would use native material, where appropriate and feasible. The refuge staff would use certified weed-free or weed-seed-free hay or straw where certified materials are required and/or are reasonably available.
- The refuge staff would provide information, training, and appropriate pest identification materials to refuge staffs, permit holders, and recreational visitors. The refuge staff would educate them about pest identification, biology, impacts, and effective prevention measures.
- The refuge staff would require grazing permittees to utilize preventative measures for their livestock while on refuge lands.
- The refuge staff would inspect borrow material for invasive plants prior to use and transport onto and/or within refuge lands.
- The refuge staff would consider invasive plants in planning for road maintenance activities.
- The refuge staff would restrict off-road travel to designated routes.

The following would be methods to prevent the introduction and/or spread of pests into refuge waters:

The refuge staff would inspect boats (including air boats), trailers, and other boating equipment. Where possible, the refuge staff would remove any visible plants, animals, or mud before leaving any waters or boat launching facilities. The refuge staff would drain water from motor, live well, bilge, and transom wells while on land before leaving the site. The refuge staff would wash and dry boats, downriggers, anchors, nets, floors of boats, propellers, axles, trailers, and other boating equipment to kill pests not visible at the boat launch.

- Before transporting to new waters, the refuge staff would rinse boat and boating equipment with hot (40°C or 104°F) clean water, spray boat or trailer with high pressure water, or dry boat and equipment for at least 5 days, where possible.
- The refuge staff would maintain a l00-foot buffer of aquatic pest-free clearance around boat launches and docks or quarantine areas when cleaning around culverts, canals, or irrigation sites. The refuge staff would clean equipment before moving to new sites. Staff would inspect and clean equipment before moving from one project area to another. These prevention methods to minimize/eliminate the introduction and/or spread of pests were taken verbatim or slightly modified from Appendix E of U.S. Forest Service (2005).

E.3.2 Mechanical/Physical Methods

These methods would remove and destroy, disrupt the growth of, or interfere with the reproduction of pest species. For plants species, these treatments can be accomplished by hand, hand tool (manual), or power tools (mechanical) and include pulling, grubbing, digging, tilling/disking, cutting, swathing, grinding, sheering, girdling, mowing, and mulching of the pest plants. Thermal techniques such as steaming, super-heated water, and hot foam may also be viable treatments.

For animal species, the refuge staff could use mechanical/physical methods that can include trapping. In some cases, non-lethally trapped animals could be relocated to off-refuge sites with prior approval from the state. Lethal trapping also can occur on a refuge as a wildlife management tool. Non-native animals (rats, rabbits, red fox, dogs, and cats) can be trapped at any time without further approval. Native predators (otter, raccoon, mink, etc.) can also be trapped, but these actions would require a trapping plan and annual trapping proposals with prior approval and coordination with the state as specified in 7 RM 15. In accordance with 7 RM 15.8E, a refuge with a current furbearer management plan or programmatic management documents (e.g., CCP) with the required information (7 RM 15.8B) would fulfill refuge trapping plan requirements.

Each of these tools would be efficacious to some degree and applicable to specific situations. In general, mechanical controls can effectively control annual and biennial pest plants. However, to control perennial plants, the root system has to be destroyed or it will resprout and continue to grow and develop. Mechanical controls are typically not capable of destroying a perennial plant's root system. Although some mechanical tools (e.g., disking, plowing) may damage root systems, they may stimulate regrowth, producing a denser plant population that may aid in the spread depending upon the target species (e.g., Canada thistle). In addition, steep terrain and soil conditions would be major factors that can limit the use of many mechanical control methods.

Some mechanical control methods (e.g., mowing), which would be used in combination with herbicides, can be a very effective technique to control perennial species. For example, mowing perennial plants followed sequentially by treating the plant regrowth with a systemic herbicide often would improve the efficacy of the herbicide compared to herbicide treatment only.

E.3.3 Cultural Methods

These methods would involve manipulating habitat to increase pest mortality by reducing its suitability to the pest. Cultural methods would include water-level manipulation, mulching, winter cover crops, changing planting dates to minimize pest impact, prescribed burning (facilitate revegetation, increase herbicide efficacy, and remove litter to assist in emergence of desirable species), flaming with propane torches, trap crops, crop rotations that would include nonsusceptible crops, moisture management, addition of beneficial insect habitat, reducing clutter, vacuuming, proper trash disposal, planting or seeding desirable species to shade or out-compete invasive plants, applying fertilizer to enhance desirable vegetation, prescriptive grazing, and other habitat alterations.

E.3.4 Biological Control Agents

Classical biological control would involve the deliberate introduction and management of natural enemies (parasites, predators, or pathogens) to reduce pest populations. Many of the most ecologically or economically damaging pest species in the United States originated in foreign countries. These newly introduced pests, which are free from the natural enemies found in their country or region of origin, may have a competitive advantage over cultivated and native species. This competitive advantage often

allows introduced species to flourish, and they may cause widespread economic damage to crops or out compete and displace native vegetation. Once the introduced pest species population reaches a certain level, traditional methods of pest management may be cost prohibitive or impractical. Biological controls typically are used when these pest populations have become so widespread that eradication or effective control would be difficult or no longer practical.

Biological control has advantages as well as disadvantages. Benefits include reducing pesticide usage, host specificity for target pests, long-term self-perpetuating control, low cost/acre, capacity for searching and locating hosts, synchronizing biological control agents to hosts' life cycles, and the unlikelihood that hosts will develop resistance to agents. Disadvantages include limited availability of agents from their native lands, the dependence of control on target species density, slow rate at which control occurs, biotype matching, the difficulty and expense of conflicts over control of the target pest, and host specificity when host populations are low.

A reduction in target species populations from biological controls is typically a slow process, and efficacy can be highly variable. It may not work well in a particular area although it does work well in other areas. Biological control agents would require specific environmental conditions to survive over time. Some of these conditions are understood, whereas, others are only partially understood or not at all.

Biological control agents would not eradicate a target pest. When using biological control agents, residual levels of the target pest typically are expected; the agent population level or survival would be dependent upon the density of its host. After the pest population decreases, the population of the biological control agent would decrease correspondingly. This is a natural cycle. Some pest populations (e.g., invasive plants) would tend to persist for several years after a biological control agent becomes established due to seed reserves in the soil, inefficiencies in the agent's search behavior, and the natural lag in population buildup of the agent.

The full range of pest groups potentially found on refuge lands and waters would include diseases, invertebrates (insects, mollusks), vertebrates, and invasive plants (most common group).
Often it is assumed that biological control would address many if not most of these pest problems. There are several well documented success stories of biological control of invasive weed species in the Pacific Northwest, including Mediterranean sage, St Johnswort (Klamath weed) and tansy ragwort. Emerging success stories include the control of Dalmatian toadflax, diffuse knapweed, leafy spurge, purple loosestrife, and yellow star thistle. However, historically, each new introduction of a biological control agent in the United States has only about a 30 percent success rate (Coombs et al 2006). Refer to Coombs et al. (2006) for the status of biological control agents for invasive plants in the Pacific Northwest.

Introduced species without desirable close relatives in the United States would generally be selected as biological controls. Natural enemies that are restricted to one or a few closely related plants in their country of origin are targeted as biological controls (Center et al.1997, Hasan and Ayres 1990).

The refuge staff would ensure introduced agents are approved by the applicable authorities.
Except for a small number of formulated biological control products registered by USEPA under FIFRA, most biological control agents are regulated by the U.S. Department of Agriculture (USDA) Animal Plant Health Inspection Service, Plant Protection and Quarantine (PPQ). State departments of agriculture and, in some cases, county agricultural commissioners or weed districts, have additional approval authority.

Federal permits (USDA-APHIS-PPQ Form 526) are required to import biocontrols agents from another state. Form 526 may be obtained by writing:

USDA-APHIS-PPQ
Biological Assessment and Taxonomic Support
4700 River Road, Unit 113
Riverdale, MD 20737

Or through the internet at URL address:
http://www.aphis.usda.gov/ppq/permits/bioligical/weedbio.html.

The Service strongly supports the development and legal and responsible use of appropriate, safe, and effective biological control agents for nuisance and nonindigenous or pest species.

State and county agriculture departments may also be sources for biological control agents or they may have information about where biological control agents may be obtained. Commercial sources should have an Application and Permit to Move Live Plant Pests and Noxious Weeds (USDA-PPQ Form 226 USDA-APHIS-PPQ, Biological Assessment and Taxonomic Support, 4700 River Road, Unit 113, Riverdale, MD 20737) to release specific biological control agents in a state and/or county. Furthermore, certification regarding the biological control agent's identity (genus, specific epithet, subspecies, and variety) and purity (e.g., parasite-free, pathogen-free, and biotic and abiotic contaminants) should be specified in purchase orders.

Biological control agents are subject to 7 RM 8 (Exotic Species Introduction and Management).In addition, the refuge staff would follow the International Code of Best Practice for Classical Biological Control of Weeds (http://sric.ucdavis.edu/exotic /exotic.htm) as ratified by delegates to the X International Symposium on Biological Control of Weeds, Bozeman, Montana, July 9, 1999.
This code identifies the following:

- Release only approved biological control agents,
- Use the most effective agents,
- Document releases, and
- Monitor for impact to the target pest, non-target species, and the environment.

Biological control agents formulated as pesticide products and registered by the EPA (e.g., *Bti*) are also subject to pesticide use proposal review and approval (see below).

A record of all releases would be maintained with date(s), location(s), and environmental conditions of the release site(s); the identity, quantity, and condition of the biological control agents released; and other relevant data and comments such as weather conditions. Systematic monitoring to determine the establishment and effectiveness of the release is also recommended.

NEPA documents regarding biological and other environmental effects of biological control agents prepared by another Federal agency, where the scope is relevant to evaluation of releases on refuge lands, would be reviewed. Possible source agencies for such NEPA documents include the Bureau of Land Management, U.S. Forest Service, National Park Service, USDAAPHIS- PPQ, and the military services. It might be appropriate to incorporate by reference parts or all of existing document(s) from the review. Incorporating by reference (40 CFR 1502.21) is a technique used to avoid redundancies in analysis. It also can reduce the bulk of a Service NEPA document, which only must identify the documents that are incorporated by reference. In addition, relevant portions must be summarized in the Service's NEPA document to the extent necessary to provide the decision maker and public with an understanding of relevance of the referenced material to the current analysis.

E.3.5 Pesticides

The selective use of pesticides would be based upon pest ecology (including mode of reproduction), the size and distribution of its populations, site-specific conditions (e.g., soils, topography), known efficacy under similar site conditions, and the capability to utilize best management practices (BMPs) to reduce/eliminate potential effects to non-target species, sensitive habitats, and potential to contaminate surface and groundwater. All pesticide usage (pesticide, target species, application rate, and method of application) would comply with the applicable Federal (FIFRA) and state regulations pertaining to pesticide use, safety, storage, disposal, and reporting. Before pesticides can be used to eradicate, control, or contain pests on refuge lands and waters, pesticide use proposals (PUPs) would be prepared and approved in accordance with 7 RM 14. PUP records would provide a detailed, time-, site-, and target-specific description of the proposed use of pesticides on the refuge. All PUPs would be created, approved, or disapproved, and stored in the Pesticide Use Proposal System (PUPS), which is a centralized database only accessible on the Service's intranet (https://sds.fws.gov/pups). Only Service employees would be authorized to access PUP records for the refuge in this database.

Chemical (baits) control of non-native predators or herbivores maybe considered mainly for relatively small infestations. If control of large populations is needed and the use of chemical control methods is chosen, then a PUP and step-down plan identifying all phases of the activity will be developed. Application equipment would be selected to provide site-specific delivery to target pests while minimizing/eliminating direct or indirect (e.g., drift) exposure to non-target areas and degradation of surface and groundwater quality. Where possible, target-specific equipment (e.g., backpack sprayer, wiper) would be used to treat target pests. Other target-specific equipment to apply pesticides would include soaked wicks or paint brushes for wiping vegetation and lances, hatchets, or syringes for direct injection into stems. Granular pesticides may be applied using seeders or other specialized dispensers. In contrast, aerial spraying (e.g., fixed wing or helicopter) would only be used where access is difficult (remoteness or fragile habitat) and/or the size/distribution of infestations precludes practical use of ground-based methods.

Because repeated use of one pesticide may allow resistant organisms to survive and reproduce, multiple pesticides with variable modes of action would be considered for treatments on refuge lands and waters. This is especially important if multiple applications within years and/or over a growing season likely would be necessary for habitat maintenance and restoration activities to achieve resource objectives. Integrated chemical and non-chemical controls also are highly effective, where practical, because pesticide resistant organisms can be removed from the site. Cost may not be the primary factor in selecting a pesticide for use on the refuge. If the least expensive pesticide would potentially harm natural resources or people, then a different product would be selected, if available. The most efficacious pesticide available with the least potential to degrade environmental quality (soils, surface water, and groundwater) as well as least potential to affect native species and communities of fish, wildlife, plants, and their habitats would be acceptable for use on the refuge in the context of an IPM approach.

E.3.6 Habitat restoration/maintenance

Restoration and/or proper maintenance of refuge habitats associated with achieving wildlife and habitat objectives would be essential for long-term prevention, eradication, or control (at or below threshold levels) of pests. Promoting desirable plant communities through the manipulation of species composition, plant density, and growth rate is an essential component of invasive plant management (Masters et al. 1996, Masters and Shelly 2001, Brooks et al. 2004). The following three components of succession could be manipulated through habitat maintenance and restoration, site availability, species availability, and species performance (Cox and Anderson 2004). Although a single method (e.g., herbicide treatment) may eliminate or suppress pest species in the short term, the resulting gaps and bare soil create niches that are

conducive to further invasion by the species and/or other invasive plants. On degraded sites where desirable species are absent or in low abundance, revegetation with native/desirable grasses, forbs, and legumes may be necessary to direct and accelerate plant community recovery, and achieve site-specific objectives in a reasonable time frame. The selection of appropriate species for revegetation would be dependent on a number of factors including resource objectives and site-specific, abiotic factors (e.g., soil texture, precipitation/temperature regimes, and shade conditions). Seed availability and cost, ease of establishment, seed production, and competitive ability also would be important considerations.

E.4 Priorities for Treatments

For many refuges, the magnitude (number, distribution, and sizes of infestations) for pest problems is too extensive and beyond the available capital resources to effectively address during any single field season. To manage pests in the refuge, it would be essential to prioritize treatment of infestations. Highest priority treatments would be focused on early detection and rapid response to eliminate infestations of new pests, if possible. This would be especially important for aggressive pests potentially impacting species, species groups, communities, and/or habitats associated with refuge purpose(s), Refuge System resources of concern (federally listed species, migratory birds, selected marine mammals, and interjurisdictional fish), and native species for maintaining/restoring biological integrity, diversity, and environmental health. The next priority would be treating established pests that appear in one or more previously uninfested areas.

Moody and Mack (1988) demonstrated through modeling that small, new outbreaks of invasive plants eventually would infest an area larger than the established, source population. They also found that control efforts focusing on the large, main infestation rather than the new, small satellites reduced the chances of overall success. The lowest priority would be treating large infestations (sometimes monotypic stands) of well-established pests. In this case, initial efforts would focus upon containment of the perimeter followed by work to control/eradicate the established infested area. If containment and/or control of a large infestation is not effective, then efforts would focus upon halting pest reproduction as the lowest priority.

Although state-listed noxious weeds would always have high priority for management, other pest species known to cause substantial ecological impact would also be considered. For example, cheatgrass may not be listed by a state as noxious, but it can greatly alter fire regimes in shrub steppe habitats resulting in large monotypic stands that displace native bunch grasses, forbs, and shrubs. Pest control would likely require a multi-year commitment from the refuge staff. Essential to the long-term success of pest management would be pre- and post-treatment monitoring, assessment of the successes and failures of treatments, and development of new approaches when proposed methods do not achieve desired outcomes.

E.5 Best Management Practices

Best Management Practices (BMPs) can minimize or eliminate possible effects associated with pesticide usage to non-target species and/or sensitive habitats as well as degradation of water quality from drift, surface runoff, or leaching. Based upon the Department of the Interior's Pesticide Use Policy (517 DM 1) and the Service's Pest Management Policy and Responsibilities (30 AM 12), the use of applicable BMPs (where feasible) would likely ensure that pesticide uses may not adversely affect federally listed species and/or their critical habitats through determinations made using the process described in 50 CFR part 402.

The following BMPs pertain to mixing/handling and applying pesticides for all groundbased treatments of pesticides, which would be considered and utilized, where feasible, based upon target- and site-specific

factors and time-specific environmental conditions. Although not listed below, the most important BMP to eliminate/reduce potential impacts to non-target resources would be an IPM approach to prevent, control, eradicate, and contain pests.

E.5.1 Pesticide Handling and Mixing

- As a precaution against spilling, spray tanks would not be left unattended during filling.
- All pesticide containers would be triple rinsed, and the rinsate would be used as water in the sprayer tank and applied to treatment areas.
- All pesticide spray equipment would be properly cleaned. Where possible, rinsate would be used as part of the make-up water in the sprayer tank and applied to treatment areas.
- The refuge staff would empty rinsed pesticide containers for recycling at local herbicide container collection facilities.
- All unused pesticides would be properly discarded at a local "safe send" collection facility.
- Pesticides and pesticide containers would be lawfully stored, handled, and disposed of in accordance with the label and in a manner safeguarding human health, fish, and wildlife and preventing soil and water contaminant.
- The refuge staff would consider the water quality parameters (e.g., pH, hardness) that are important to ensure greatest efficacy where specified on the pesticide label.
- All pesticide spills would be addressed immediately using procedures identified in the refuge spill response plan.

E.5.2 Applying Pesticides

- Pesticide treatments would only be conducted by or under the supervision of Service personnel and non-Service applicators with the appropriate state or BLM certification to safely and effectively conduct these activities on refuge lands and waters.
- The refuge staff would comply with all Federal, state, and local pesticide use laws and regulations as well as Departmental, Service, and Refuge System pesticide-related policies. For example, the refuge staff would use application equipment and apply rates for the specific pest(s) identified on the pesticide label as required under FIFRA.
- Before each treatment season and prior to mixing or applying any product for the first time each season, all applicators would review the labels, Material Safety Data Sheets (MSDSs), and Pesticide Use Proposal (PUPs) for each pesticide, determining the target pest, appropriate mix rate(s), Personal Protective Equipment (PPE), and other requirements listed on the pesticide label.
- A 1-foot no-spray buffer from the water's edge would be used, where applicable and where it does not detrimentally influence effective control of pest species.
- Spot treatment would be used rather than broadcast applications of pesticides, where practical.
- Applicators would use and adjust spray equipment to apply the coarsest droplet size spectrum with optimal coverage of the target species while reducing drift.
- Applicators would use the largest droplet size that results in uniform coverage.
- Applicators would use drift reduction technologies such as low-drift nozzles, where possible.
- Where possible, spraying would occur during low (average less than 10 mph and preferably 3 to 7 mph) and consistent direction wind conditions with moderate temperatures (typically lower than 85°F).
- Where possible, applicators would avoid spraying during inversion conditions (often

associated with calm and very low wind conditions) that can cause large-scale herbicide drift to non-target areas.
- Equipment would be calibrated regularly to ensure that the proper rate of pesticide is applied to the target area or species.
- Spray applications would be made at the lowest height for uniform coverage of target pests to minimize/eliminate potential drift.
- If windy conditions frequently occur during afternoons, spraying (especially boom treatments) would typically be conducted during early morning hours.
- Spray applications would not be conducted on days with more than a 30 percent forecast for rain within 6 hours, except for pesticides that are rapidly rain fast (e.g., glyphosate in 1 hour) to minimize/eliminate potential runoff.
- Where possible, applicators would use drift retardant adjuvants during spray applications, especially adjacent to sensitive areas.
- Where possible, applicators would use a nontoxic dye to aid in identifying target areas treated as well as potential over spray or drift. A dye can also aid in detecting equipment leaks. If a leak is discovered, the application would be stopped until repairs could be made to the sprayer.
- For pesticide uses associated with cropland and facilities management, buffers, as appropriate, would be used to protect sensitive habitats, especially wetlands and other aquatic habitats.
- When drift cannot be sufficiently reduced through altering equipment set up and application techniques, buffer zones may be identified to protect sensitive areas downwind of applications. The refuge staff would only apply adjacent to sensitive areas when the wind is blowing the opposite direction.
- Applicators would utilize scouting for early detection of pests to eliminate unnecessary pesticide applications.
- The refuge staff would consider timing of application so native plants are protected (e.g., senescence) while effectively treating invasive plants.
- Rinsate from cleaning spray equipment after application would be recaptured and reused or applied to an appropriate pest plant infestation.
- Application equipment (e.g., sprayer, ATV, tractor) would be thoroughly cleaned and PPE would be removed/disposed of onsite by applicators after treatments to eliminate the potential spread of pests to uninfested areas.

E.6 Safety

E.6.1 Personal Protective Equipment

All applicators would wear the PPE identified on the pesticide label. The appropriate PPE will be worn at all times during handling, mixing, and applying. PPE can include the following: disposable (e.g., Tyvek) or laundered coveralls; gloves (latex, rubber, or nitrile); rubber boots; and/or a respirator approved by the National Institute for Occupational Safety and Health (NIOSH). Because exposure to concentrated product is usually greatest during mixing, extra care should be taken while preparing pesticide solutions. Persons mixing these solutions can be best protected if they wear long gloves, an apron, footwear, and a face shield.

Coveralls and other protective clothing used during an application would be laundered separately from other laundry items. Transporting, storing, handling, mixing, and disposing of pesticide containers will

be consistent with label requirements, EPA, and Occupational Safety and Health Administration (OSHA) requirements, and Service policy.

If a respirator is necessary for a pesticide use, then the following requirements would be met in accordance with Service safety policy—a written Respirator Program, fit testing, physical examination (including pulmonary function and blood work for contaminants), and proper storage of the respirator.

E.6.2 Notification

The restricted entry interval (REI) is the waiting period required after pesticide application. Once the REI ends, individuals may safely enter a treated area without PPE. Refuge staff, authorized management agents of the Service, volunteers, and members of the public who could be in or near a pesticide-treated area within the stated re-entry time period on the label would be notified about treatment areas. Posting would occur at any site where individuals might inadvertently become exposed to a pesticide during other activities on the refuge. Where required by the label and/or state-specific regulations, sites would also be posted on its perimeter and at other likely locations of entry. The refuge staff would also notify appropriate private property owners of an intended application, including any private individuals who have requested notification. Special efforts would be made to contact nearby individuals who are beekeepers or who have expressed chemical sensitivities.

E.6.3 Medical Surveillance

Medical surveillance may be required for Service personnel who mix, apply, and/or monitor use of pesticides (see 242 FW 7 [Pesiticide Users] and 242 FW 4 [Medical Surveillance]). In accordance with draft Service policy (242 FW 7 [Pesticide Users Safety]), medical monitoring would be necessary for Service personnel and approved volunteers engaged in "frequent pesticide use" that is defined as a "pesticide applicator handling, mixing, and applying pesticides for 8 or more hours in any week or 16 or more hours in any 30 day period." However, refuge cooperators (e.g., cooperative farmers) and other authorized agents (e.g., state and county employees) would be responsible for their own medical monitoring needs and costs. Standard examinations (at refuge expense) of appropriate refuge staff would be provided by the nearest certified occupational health and safety physician as determined by Federal Occupational Health.

E.6.4 Certification and Supervision of Pesticide Applicators

Appropriate refuge staff handling, mixing, and/or applying or supervising others engaged in pesticide use activities would be trained and state or Federally (BLM) licensed to apply pesticides to refuge lands or waters (242 FW 7). Preferably, all refuge staff participating in pest management activities involving pesticide usage would attend appropriate training. New staff unfamiliar with proper procedures for storing, mixing, handling, applying, and disposing of herbicides and containers would receive orientation and training before handling or using any products. Documentation of training would be kept in the files at the refuge office.

E.6.5 Record Keeping

E.6.5.1 Labels and material safety data sheets

Pesticide labels and MSDSs would be maintained at the refuge shop with laminated copies located in the mixing area. These documents would be carried by field applicators where possible. A written reference (e.g., note pad, chalk board, dry erase board) for each tank to be mixed would be kept in the mixing area

for quick reference during mixing. In addition, approved PUPs stored in the PUPS database typically contain website links to pesticide labels and MSDSs.

E.6.5.2 Pesticide use proposals (PUPs)

A PUP would be prepared for each proposed pesticide use associated with annual pest management on refuge lands and waters. A PUP would include specific information about the proposed pesticide use, including the common and chemical names of the pesticide(s), target pest species, size and location of treatment site(s), application rate(s) and method(s), and federally listed species determinations, where applicable.

In accordance with 30 AM 12 and 7 RM 14, PUPs would be required for the following:

- Uses of pesticides on lands and facilities owned or managed by the Service, including properties managed by Service personnel as a result of the Food Security Act of 1985;
- Service projects by non-Service personnel on Service-owned or controlled lands and facilities and other pest management activities that would be conducted by Service personnel; and
- Where the Service would be responsible or provides funds for pest management identified in protective covenants, easements, contracts, or agreements off Service lands.

In accordance with Service guidelines (Director's memo [December 12, 2007]), a refuge staff may receive up to 5-year approvals for Washington Office and field-reviewed proposed pesticide uses based upon meeting identified criteria, including an approved IPM plan, where necessary (see http://www.fws.gov/contaminants/Issues/IPM.cfm). For a refuge, an IPM plan (requirements described herein) can be completed independently or in association with a CCP or HMP if IPM strategies and potential environmental effects are adequately addressed within appropriate NEPA documentation.

PUPs would be created, approved or disapproved, and stored as records in the PUPS, which is a centralized database on the Service's intranet (https://sds.fws.gov/pups). Only Service employees can access PUP records in this database.

E.6.5.3 Pesticide usage

In accordance with 30 AM 12 and 7 RM 14, the refuge Project Leader would be required to maintain records of all pesticides annually applied on lands or waters under refuge jurisdiction. This would encompass pesticides applied by other Federal agencies, state and county governments, nongovernment applicators, including cooperators and their pest management service providers, with Service permission. For clarification, pesticide means all insecticides, insect and plant growth regulators, dessicants, herbicides, fungicides, rodenticides, acaricides, nematicides, fumigants, avicides, and piscicides.

The following usage information can be reported for approved PUPs in the PUPS database:

- Pesticide trade name(s)
- Active ingredient(s)
- Total acres treated
- Total amount of pesticides used (lbs or gallons)
- Total amount of active ingredient(s) used (lbs)
- Target pest(s)
- Efficacy (percent control)

To determine whether treatments are efficacious (eradicating, controlling, or containing the target pest) and achieving resource objectives, habitat and/or wildlife response would be monitored both pre- and post-treatment, where possible. Considering available annual funding and staffing, appropriate monitoring data regarding characteristics (attributes) of pest infestations (e.g., area, perimeter, degree of infestation-density, % cover, density), as well as habitat and/or wildlife response to treatments may be collected and stored in a relational database, preferably a geo-referenced data management system (e.g., Refuge Lands GIS [RLGIS]) to facilitate data analyses. In accordance with adaptive management, data analysis and interpretation would allow treatments to be modified or changed over time, as necessary, to achieve resource objectives considering site-specific conditions in conjunction with habitat and/or wildlife responses.

E.7 Evaluating Pesticide Use Proposals

Pesticides would only be used on the refuge for habitat management as well as croplands/facilities maintenance after approval of a PUP. Proposed pesticide uses on the refuge would only be approved where there would likely be minor, temporary, or localized effects to fish and wildlife species as well as minimal potential to degrade environmental quality. Potential effects to listed and non-listed species would be evaluated with quantitative ecological risk assessments. Potential effects to environmental quality would be based upon pesticide characteristics of environmental fate (water solubility, soil mobility, soil persistence, and volatilization) and a quantitative screening tool for potential to move to groundwater. Risk assessments as well as characteristics of environmental fate and potential to degrade water quality for pesticides would be documented in Chemical Profiles (see Section 7.5). These profiles would include threshold values for quantitative measures of ecological risk assessments and screening tools for environmental fate that represent minimal potential effects to species and environmental quality. Only pesticide uses with appropriate BMPs (see Section 4.0) for habitat management and cropland/facilities maintenance on the refuge that would potentially have minor, temporary, or localized effects on refuge biological and environmental quality (threshold values not exceeded) would be approved.

E.7.1 Overview of Ecological Risk Assessment

An ecological risk assessment process would be used to evaluate potential adverse effects to biological resources as a result of a pesticide(s) proposed for use on the refuge. It is an established quantitative and qualitative methodology for comparing and prioritizing risks of pesticides and conveying an estimate of the potential risk for an adverse effect. The quantitative methodology would be an efficient way to integrate best available scientific information regarding hazard, patterns of use (exposure), and dose-response relationships in a manner that is useful for ecological risk decision-making. It would provide an effective way to evaluate potential effects where there is missing or unavailable scientific information (data gaps) to address reasonable, foreseeable adverse effects as required under 40 CFR Part 1502.22.

Protocols for ecological risk assessment of pesticide uses on the refuge were developed through research and established by the US Environmental Protection Agency (2004). Assumptions for these risk assessments are presented in Section 6.2.3.

The toxicological data used in ecological risk assessments are typically results of standardized laboratory studies provided by pesticide registrants to the EPA to meet regulatory requirements under FIFRA. These studies assess the acute (lethality) and chronic (reproductive) effects associated with short- and long-term exposure to pesticides on representative species of birds, mammals, freshwater fish, aquatic invertebrates, and terrestrial and aquatic plants, respectively (Table 1). Other effects data publicly available would also

be utilized for risk assessment protocols described herein. Toxicity endpoint and environmental fate data are available from a variety of resources. Some of the more useful resources can be found in Section 7.5.

Table E.1 Ecotoxicity tests used to evaluate potential effects to birds, fish, and mammals to establish toxicity endpoints for risk quotient calculations.

Species Group	Exposure	Measurement endpoint
Bird	Acute	Median Lethal Concentration (LC_{50})
	Chronic	No Observed Effect Concentration (NOEC) or No Observed Adverse Effect Concentration (NOAEC)[1]
Fish	Acute	Median Lethal Concentration (LC_{50})
	Chronic	No Observed Effect Concentration (NOEC) or No Observed Adverse Effect Concentration (NOAEC)[2]
Mammal	Acute	Oral Lethal Dose (LD_{50})
	Chronic	No Observed Effect Concentration (NOEC) or No Observed Adverse Effect Concentration (NOAEC)[3]

1. Measurement endpoints typically include a variety of reproductive parameters (e.g., number of eggs, number of offspring, eggshell thickness, and number of cracked eggs).
2. Measurement endpoints for early life stage/life cycle typically include embryo hatch rates, time to hatch, growth, and time to swim-up.
3. Measurement endpoints include maternal toxicity, teratogenic effects or developmental anomalies, evidence of mutagenicity or genotoxicity, and interference with cellular mechanisms such as DNA synthesis and DNA repair.

E.7.2 Determining Ecological Risk to Fish and Wildlife

The potential for pesticides used on the refuge to cause direct adverse effects to fish and wildlife would be evaluated using EPA's Ecological Risk Assessment Process (EPA 2004). This deterministic approach, which is based upon a two-phase process involving estimation of environmental concentrations and then characterization of risk, would be used for ecological risk assessments. This method integrates exposure estimates—estimated environmental concentration (EEC)—and toxicological endpoints (e.g., LC50 and oral LD50) to evaluate the potential for adverse effects to species groups (birds, mammals, and fish) representative of legal mandates for managing units of the Refuge System. This integration is achieved through risk quotients (RQs) calculated by dividing the EEC by acute and chronic toxicity values selected from standardized toxicological endpoints or published effect (Table 1).

$$RQ = EEC/Toxicological\ Endpoint$$

The level of risk associated with direct effects of pesticide use would be characterized by comparing calculated RQs to the appropriate Level of Concern (LOC) established by EPA (1998) (Table 2). The LOC represents a quantitative threshold value for screening potential adverse effects to fish and wildlife resources associated with pesticide use. The following are four exposure-species group scenarios that would be examined to characterize ecological risk to fish and wildlife on the refuge: acute-listed species, acute-nonlisted species, chronic-listed species, and chronic-nonlisted species.

Acute risk would indicate the potential for mortality associated with short-term dietary exposure to pesticides immediately after an application. For characterization of acute risks, median values from LC50 and LD50 tests would be used as toxicological endpoints for RQ calculations. In contrast, chronic risks would indicate the potential for adverse effects associated with long-term dietary exposure to pesticides from a single application or multiple applications over time (within a season and over years).

For characterization of chronic risks, the no observed adverse effect concentration (NOAEC) or no observed effect concentration (NOEC) for reproduction would be used as toxicological endpoints for RQ calculations. Where available, the NOAEC would be preferred over an NOEC value. Listed species are those federally designated as threatened, endangered, or proposed in accordance with the Endangered Species Act of 1973 (16 USC 1531-1544, 87 Stat.884, as amended-Public Law 93-205). For listed species, potential adverse effects would be assessed at the individual level because loss of individuals from a population could detrimentally impact a species. In contrast, risks to nonlisted species would consider effects at the population level. An RQ less than LOC for a taxonomic group would indicate the proposed pesticide use is "may affect, not likely to adversely affect" individuals (listed species) or populations (nonlisted species) of the taxonomic group (Table 2). In contrast, an RQ greater than LOC, would indicate an unacceptable ecological risk considering the potential for adverse effects.

Table E.2 Presumption of unacceptable risk for birds, fish, and mammals (EPA 1998)

Risk Presumption		Level of Concern	
		Listed Species	Non-listed Species
Acute	Birds	0.1	0.5
	Fish	0.05	0.5
	Mammals	0.1	0.5
Chronic	Birds	1.0	1.0
	Fish	1.0	1.0
	Mammals	1.0	1.0

E.7.2.1 Environmental exposure

Following release into the environment through application, pesticides would experience several different routes of environmental fate. Pesticides which would be sprayed can move through the air (e.g., particle or vapor drift) and may eventually end up in other parts of the environment, such as non-target vegetation, soil, or water. Pesticides applied directly to the soil may be washed off the soil into nearby bodies of surface water (e.g., surface runoff) or may percolate through the soil to lower soil layers and groundwater (e.g., leaching) (Baker and Miller 1999, Pope et al. 1999, Butler et al. 1998, Ramsay et al.1995, EXTOXNET 1993*a*). Pesticides which would be injected into the soil may also be subject to the latter two fates.

The aforementioned possibilities are by no means complete, but they do indicate that movement of pesticides in the environment is very complex, with transfers occurring continually among different environmental compartments. In some cases, these exchanges occur not only between areas that are close together, but it also may involve transportation of pesticides over long distances (Barry 2004, Woods 2004).

Terrestrial exposure

The estimated environmental concentration (ECC) for exposure to terrestrial wildlife would be quantified using an EPA screening level approach (EPA 2004). This screening level approach is not affected by product formulation because it evaluates a pesticide's active ingredient(s). This approach would vary depending upon the proposed pesticide application method: spray or granular.

Terrestrial-spray application

For spray applications, exposure would be determined using the Kanaga nomogram method (EPA 2005*a*, EPA 2004, Pfleeger et al.1996) through the EPA's Terrestrial Residue Exposure model (T-REX) version 1.2.3 (EPA 2005*b*). To estimate the maximum (initial) pesticide residue on short grass (shorter than 20 cm tall) as a general food item category for terrestrial vertebrate species, T-REX input variables would include the following from the pesticide label: maximum pesticide application rate (pounds active ingredient acid equivalent/acre) and pesticide half-life (days) in soil. Although there are other food item categories (tall grasses; broadleaf plants and small insects; fruits, pods, seeds and large insects), short grass was selected because it would yield maximum EECs (240 ppm per pound active ingredient/acre) for worst-case risk assessments. Short grass is not representative of forage for carnivorous species (e.g., raptors), but it would characterize the maximum potential exposure through the diet of avian and mammalian prey items. Consequently, this approach would provide a conservative screening tool for pesticides that do not biomagnify.

For RQ calculations in T-REX, the model would require the weight of surrogate species and Mineau scaling factors (Mineau et al.1996). Body weights of bobwhite quail and mallard are included in T-REX by default, but body weights of other organisms (Table 3) would be entered manually. The Mineau scaling factor accounts for small-bodied bird species that may be more sensitive to pesticide exposure than would be predicted only by body weight. Mineau scaling factors would be entered manually with values ranging from 1 to 1.55 that are unique to a particular pesticide or group of pesticides. If specific information to select a scaling factor is not available, then a value of 1.15 would be used as a default. Alternatively, zero would be entered if it is known that body weight does not influence toxicity of pesticide(s) being assessed. The upper bound estimate output from the T-REX Kanaga nomogram would be used as an EEC for calculation of RQs. This approach would yield a conservative estimate of ecological risk.

Table E.3 Average body weight of selected terrestrial wildlife species frequently used in research to establish toxicological endpoints (Dunning 1984).

Species	Body Weight (kg)
Mammal (15 g)	0.015
House sparrow	0.0277
Mammal (35 g)	0.035
Starling	0.0823
Red-winged blackbird	0.0526
Common grackle	0.114
Japanese quail	0.178
Bobwhite quail	0.178
Rat	0.200
Rock dove (aka pigeon)	0.542
Mammal (1000 g)	1.000
Mallard	1.082
Ring-necked pheasant	1.135

Terrestrial – granular application

Granular pesticide formulations and pesticide-treated seed would pose a unique route of exposure for avian and mammalian species. The pesticide is applied in discrete units which birds or mammals might ingest accidentally with food items or intentionally as in the case of some bird species actively seeking and picking up gravel or grit to aid digestion or seed as a food source. Granules may also be consumed

by wildlife foraging on earthworms, slugs, or other softbodied soil organisms to which the granules may adhere.

Terrestrial wildlife RQs for granular formulations or seed treatments would be calculated by dividing the maximum milligrams of active ingredient (ai) exposed (e.g., EEC) on the surface of an area equal to 1 square foot by the appropriate LD50 value multiplied by the surrogate's body weight (Table 3). An adjustment to surface area calculations would be made for broadcast, banded, and in-furrow applications. An adjustment also would be made for applications with and without incorporation of the granules. Without incorporation, it would be assumed that 100 percent of the granules remain on the soil surface available to foraging birds and mammals.

Press wheels push granules flat with the soil surface, but they are not incorporated into the soil. If granules are incorporated in the soil during band or T-band applications or after broadcast applications, it would be assumed only 15 percent of the applied granules remain available to wildlife. It would be assumed that only 1 percent of the granules are available on the soil surface following in-furrow applications.

The EECs for pesticides applied in granular form and as seed treatments would be determined considering potential ingestion rates of avian or mammalian species (e.g., 10-30 percent body weight/day). This would provide an estimate of maximum exposure that may occur as a result of granule or seed treatment spills such as those that commonly occur at end rows during application and planting. The availability of granules and seed treatments to terrestrial vertebrates would also be considered by calculating the loading per unit area (LD50/ft2) for comparison to EPA Levels of Concern (EPA 1998). The T-REX version 1.2.3 (EPA 2005*b*) contains a submodel which automates Kanaga exposure calculations for granular pesticides and treated seed.

The following formulas will be used to calculate EECs depending upon the type of granular pesticide application:

- In-furrow applications assume a typical value of 1 percent granules, bait, or seed remain unincorporated.

mg a.i./ft.^{2}= [(lbs. product/acre)(% a.i.)(453,580 mg/lbs)(1% exposed))] / {[(43,560 ft.^{2}/acre)/(row spacing (ft.))] / (row spacing (ft.)}

or

mg a.i./ft.^{2}= [(lbs product/1000 ft. row)(% a.i.)(1000 ft row)(453,580 mg/lb.)(1% exposed)

EEC = [(mg a.i./ft.^{2})(% of pesticide biologically available)]

- Incorporated banded treatments assume that 15 percent of granules, bait, or seeds are unincorporated.

mg a.i./ft.^{2}= [(lbs. product/1000 row ft.)(% a.i.)(453,580 mg/lb.)(1-% incorporated)] / (1,000 ft.)(band width (ft.))

EEC = [(mg a.i./ft.^{2})(% of pesticide biologically available)]

- Broadcast treatment without incorporation assumes 100 percent of granules, bait, seeds

are unincorporated.

mg a.i./ft.^{2}= [(lbs. product/acre)(% a.i.)(453,590 mg/lb.)] / (43,560 ft.^{2}/acre)

EEC = [(mg a.i./ft.^{2})(% of pesticide biologically available)]

Where:

- *% of pesticide biologically available = 100% without species specific ingestion rates*
- *Conversion for calculating mg a.i./ft.^{2}using ounces: 453,580 mg/lb. /16 = 28,349 mg/oz.*

The following equation would be used to calculate an RQ based on the EEC calculated by one of the above equations. The EEC would be divided by the surrogate LD50 toxicological endpoint multiplied by the body weight (Table 3) of the surrogate.

*RQ = EEC / [LD50 (mg/kg) * body weight (kg)]*

As with other risk assessments, an RQ greater than LOC would be a presumption of unacceptable ecological risk. An RQ less than LOC would be a presumption of acceptable risk with only minor, temporary, or localized effects to species.

Aquatic exposure

Exposures to aquatic habitats (e.g., wetlands, meadows, ephemeral pools, water delivery ditches) would be evaluated separately for ground-based pesticide treatments of habitats managed for fish and wildlife compared with cropland/facilities maintenance. The primary exposure pathway for aquatic organisms from any ground-based treatments likely would be particle drift during the pesticide application. However, different exposure scenarios would be necessary as a result of contrasting application equipment and techniques as well as pesticides used to control pests on agricultural lands (especially those cultivated by cooperative farmers for economic return from crop yields) and facilities maintenance (e.g., roadsides, parking lots, trails) compared with other managed habitats on the refuge. In addition, pesticide applications may be done less than 25 feet from the high water mark of aquatic habitats for habitat management treatments; whereas, no-spray buffers (25 feet or more) would be used for croplands/facilities maintenance treatments.

Habitat treatments

For the worst-case exposure scenario to non-target aquatic habitats, EECs (Table 4) would be would be derived from Urban and Cook (1986) that assumes an intentional overspray to an entire, non-target water body (1-foot depth) from a treatment less than 25 feet from the high water mark using the max application rate (acid basis [see above]). However, use of BMPs for applying pesticides (see Section 4.2) would likely minimize/eliminate potential drift to non-target aquatic habitats during actual treatments. If there would be unacceptable (acute or chronic) risk to fish and wildlife with the simulated 100 percent overspray (RQ greater than LOC), then the proposed pesticide use may be disapproved or the PUP would be approved at a lower application rate to minimize/eliminate unacceptable risk to aquatic organisms (RQ=LOC).

Table E.4 Estimated Environmental Concentrations (ppb) of pesticides in aquatic habitats (1 foot depth) immediately after direct application (Urban and Cook 1986)

Lbs/acre	EEC (ppb)
0.10	36.7
0.20	73.5
0.25	91.9
0.30	110.2
0.40	147.0
0.50	183.7
0.75	275.6
1.00	367.5
1.25	459.7
1.50	551.6
1.75	643.5
2.00	735.7
2.25	827.6
2.50	919.4
3.00	1103.5
4.00	1471.4
5.00	1839
6.00	2207
7.00	2575
8.00	2943
9.00	3311
10.00	3678

Cropland/facilities maintenance treatments

Field drift studies conducted by the Spray Drift Task Force, which is a joint project of several agricultural chemical businesses, were used to develop a generic spray drift database. From this database, the AgDRIFT computer model was created to satisfy EPA's pesticide registration spray drift data requirements and as a scientific basis to evaluate off-target movement of pesticides from particle drift and assess potential effects of exposure to wildlife. Several versions of the computer model have been developed (i.e., v2.01 through v2.10). The Spray Drift Task Force AgDRIFT® model version 2.01 (SDTF 2003, AgDRIFT 2001) would be used to derive EECs resulting from drift of pesticides to refuge aquatic resources from ground-based pesticide applications greater than 25 feet from the high water mark. The Spray Drift Task Force AgDRIFT model is publicly available at http://www.agridrift.com. At this website, click "AgDRIFT 2.0" and then click "Download Now" and follow the instructions to obtain the computer model.

The AgDRIFT model is composed of submodels called tiers. Tier I Ground submodel would be used to assess ground-based applications of pesticides. Tier outputs (EECs) would be calculated with AgDRIFT using the following input variables: max application rate (acid basis [see above]), low boom (20 inches), fine to medium/coarse droplet size, 20 swaths, EPA-defined wetland, and a buffer of 25 feet or more from the treated area to water.

E.7.2.2 Use of information on effects of biological control agents, pesticides, degradates, and adjuvants

The NEPA documents regarding biological and other environmental effects of biological control agents, pesticides, degradates, and adjuvants prepared by another Federal agency, where the scope would be relevant to evaluation of effects from pesticide uses on refuge lands, would be reviewed. Possible source agencies for such NEPA documents would include the Bureau of Land Management, U.S. Forest Service, National Park Service, U.S. Department of Agriculture-Animal and Plant Health Inspection Service, and the U.S. military services. It might be appropriate to incorporate by reference parts or all of existing document(s). Incorporating by reference (40 CFR 1502.21) is a technique used to avoid redundancies in analysis. It would also reduce the bulk of a Service NEPA document, which would only identify the documents that are incorporated by reference. In addition, relevant portions would be summarized in the Service's NEPA document to the extent necessary to provide the decision maker and public with an understanding of relevance of the referenced material to the current analysis.

In accordance with the requirements set forth in 40 CFR 1506.3, the Service would specifically adopt and incorporate through reference ecological risk assessments prepared by the U.S. Forest Service (http://www.fs.fed.us/r6/invasiveplant-eis/Risk-Assessments/Herbicides-Analyzed-InvPlant-EIS.htm) and Bureau of Land Management (http://www.blm.gov/wo/st/en/prog/more/veg_eis.html). These risk assessments and associated documentation also are available in total with the administrative record for the Final Environmental Impact Statement entitled *Pacific Northwest Region Invasive Plant Program – Preventing and Managing Invasive Plants* (U.S. Forest Service 2005) and *Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic EIS (PEIS)* (BLM 2007).

As a basis for completing "Chemical Profiles" for approving or disapproving refuge PUPs, ecological risk assessments for the following herbicide and adjuvant uses prepared by the U.S. Forest Service would be adopted and incorporated by reference:

- 2,4-D
- Chlorosulfuron
- Clopyralid
- Dicamba
- Glyphosate
- Imazapic
- Imazapyr
- Metsulfuron methyl
- Picloram
- Sethoxydim
- Sulfometuron methyl
- Triclopyr
- Nonylphenol polyethylate (NPE) based surfactants

As a basis for completing "Chemical Profiles" for approving or disapproving refuge PUPs, ecological risk assessments for the following herbicide uses as well as evaluation of risks associated with pesticide degradates and adjuvants prepared by the Bureau of Land Management would be adopted and incorporated by reference:

- Bromacil
- Chlorsulfuron
- Diflufenzopyr
- Diquat

- Diuron
- Fluridone
- Imazapic
- Overdrive
- Sulfometuron methyl
- Tebuthiuron
- Pesticide degradates and adjuvants (*Appendix D – Evaluation of risks from degradates, polyoxyethylene-amine (POEA) and R-11, and endocrine disrupting chemicals*)

E.7.2.3 Assumptions for ecological risk assessments

There are a number of assumptions involved with the ecological risk assessment process for terrestrial and aquatic organisms associated with utilization of the EPA's (2004) process. These assumptions may be risk neutral or may lead to an over- or under-estimation of risk from pesticide exposure depending upon site-specific conditions. The following describes these assumptions, their application to the conditions typically encountered, and whether or not they may lead to recommendations that are risk neutral, underestimate, or overestimate ecological risk from potential pesticide exposure.

- Indirect effects would not be evaluated by ecological risk assessments. These effects include the mechanisms of indirect exposure to pesticides: consuming prey items (fish, birds, or small mammals); reductions in the availability of prey items; and disturbance associated with pesticide application activities.
- Exposure to a pesticide product can be assessed based upon the active ingredient. However, exposure to a chemical mixture (pesticide formulation) may result in effects that are similar or substantially different compared to only the active ingredient. Non-target organisms may be exposed directly to the pesticide formulation or only various constituents of the formulation as they dissipate and partition in the environment. If toxicological information for both the active ingredient and formulated product are available, then data representing the greatest potential toxicity would be selected for use in the risk assessment process (EPA 2004). As a result, this conservative approach may lead to an overestimation of risk characterization from pesticide exposure.
- Because toxicity tests with listed or candidate species or closely related species are not available, data for surrogate species would be most often used for risk assessments. Specifically, bobwhite quail and mallard duck are the most frequently used surrogates for evaluating potential toxicity to federally listed avian species. Bluegill sunfish, rainbow trout, and fathead minnow are the most common surrogates for evaluating toxicity for freshwater fishes. However, sheep's head minnow can be an appropriate surrogate marine species for coastal environments. Rats and mice are the most common surrogates for evaluating toxicity for mammals. Interspecies sensitivity is a major source of uncertainty in pesticide assessments. As a result of this uncertainty, data is selected for the most sensitive species tested within a taxonomic group (birds, fish, and mammals) given the quality of the data is acceptable. If additional toxicity data for more species of organisms in a particular group are available, the selected data will not be limited to the species previously listed as common surrogates.
- The Kanaga nomogram outputs maximum EEC values that may be used to calculate an average daily concentration over a specified interval of time, which is referred to as a time-weighted-average (TWA). The maximum EEC would be selected as the exposure input for both acute and chronic risk assessments in the screening-level evaluations. The initial or maximum EEC derived from the Kanaga nomogram represents the maximum expected instantaneous or acute exposure to a pesticide. Acute toxicity endpoints are determined using a single exposure to a known pesticide concentration typically for 48 to 96 hours. This value is assumed to represent ecological risk from acute exposure to a pesticide. On the other hand, chronic risk to pesticide exposure is a

function of pesticide concentration and duration of exposure to the pesticide. An organism's response to chronic pesticide exposure may result from either the concentration of the pesticide, length of exposure, or some combination of both factors. Standardized tests for chronic toxicity typically involve exposing an organism to several different pesticide concentrations for a specified length of time (days, weeks, months, years or generations). For example, avian reproduction tests include a 10-week exposure phase. Because a single length of time is used in the test, time response data is usually not available for inclusion into risk assessments. Without time response data it is difficult to determine the concentration which elicited a toxicological response.

- Using maximum EECs for chronic risk estimates may result in an overestimate of risk, particularly for compounds that dissipate rapidly. Conversely, using TWAs for chronic risk estimates may underestimate risk if it is the concentration rather than the duration of exposure that is primarily responsible for the observed adverse effect. The maximum EEC would be used for chronic risk assessments although it may result in an overestimate of risk. TWAs may be used for chronic risk assessments, but they will be applied judiciously considering the potential for an underestimate or overestimate of risk. For example, the number of days exposure exceeds a Level of Concern may influence the suitability of a pesticide use. The greater the number of days the EEC exceeds the Level of Concern translates into greater the ecological risk. This is a qualitative assessment, and is subject to reviewer's expertise in ecological risk assessment and tolerance for risk.
- The length of time used to calculate the TWA can have a substantial effect on the exposure estimates and there is no standard method for determining the appropriate duration for this estimate. The T-REX model assumes a 21-week exposure period, which is equivalent to avian reproductive studies designed to establish a steady-state concentration for bioaccumulative compounds. However, this does not necessarily define the true exposure duration needed to elicit a toxicological response. Pesticides, which do not bioaccumulate, may achieve a steady-state concentration earlier than 21 weeks. The duration of time for calculating TWAs will require justification and it will not exceed the duration of exposure in the chronic toxicity test (approximately 70 days for the standard avian reproduction study). An alternative to using the duration of the chronic toxicity study is to base the TWA on the application interval. In this case, increasing the application interval would suppress both the estimated peak pesticide concentration and the TWA. Another alternative to using TWAs would be to consider the number of days that a chemical is predicted to exceed the LOC.
- Pesticide dissipation is assumed to be first-order in the absence of data suggesting alternative dissipation patterns such as bi-phasic. Field dissipation data would generally be the most pertinent for assessing exposure in terrestrial species that forage on vegetation. However, this data is often not available and it can be misleading particularly if the compound is prone to "wash-off." Soil half-life is the most common degradation data available. Dissipation or degradation data that would reflect the environmental conditions typical of refuge lands would be utilized, if available.
- For species found in the water column, it would be assumed that the greatest bioavailable fraction of the pesticide active ingredient in surface waters is freely dissolved in the water column.
- Actual habitat requirements of any particular terrestrial species are not considered, and it is assumed that species exclusively and permanently occupy the treated area, or adjacent areas receiving pesticide at rates commensurate with the treatment rate. This assumption would produce a maximum estimate of exposure for risk characterization. This assumption would likely lead to an overestimation of exposure for species that do not permanently and exclusively occupy the treated area (EPA 2004).
- Exposure through incidental ingestion of pesticide contaminated soil is not considered in the EPA risk assessment protocols. Research suggests less than 15 percent of the diet can consist of

incidentally ingested soil depending upon species and feeding strategy (Beyer et al. 1994). An assessment of pesticide concentrations in soil compared to food item categories in the Kanaga nomogram indicates incidental soil ingestion will not likely increase dietary exposure to pesticides. Inclusion of soil into the diet would effectively reduce the overall dietary concentration compared to the present assumption that the entire diet consists of a contaminated food source (Fletcher et al. 1994). An exception to this may be soil-applied pesticides in which exposure from incidental ingestion of soil may increase. Potential for pesticide exposure under this assumption may be underestimated for soil-applied pesticides and overestimated for foliar-applied pesticides. The concentration of a pesticide in soil would likely be less than predicted on food items.

- Exposure through inhalation of pesticides is not considered in the EPA risk assessment protocols. Such exposure may occur through three potential sources: spray material in droplet form at time of application, vapor phase with the pesticide volatilizing from treated surfaces, and airborne particulates (soil, vegetative matter, and pesticide dusts). The EPA (1990) reported exposure from inhaling spray droplets at the time of application is not an appreciable route of exposure for birds. According to research on mallards and bobwhite quail, respirable particle size (particles reaching the lung) in birds is limited to maximum diameter of 2 to 5 microns. The spray droplet spectra covering the majority of pesticide application scenarios indicate that less than 1 percent of the applied material is within the respirable particle size. This route of exposure is further limited because the permissible spray drop size distribution for ground pesticide applications is restricted to ASAE medium or coarser drop size distribution.
- Inhalation of a pesticide in the vapor phase may be another source of exposure for some pesticides under certain conditions. This mechanism of exposure to pesticides occurs post application and it would pertain to those pesticides with a high vapor pressure. The EPA is currently evaluating protocols for modeling inhalation exposure from pesticides including near-field and near-ground air concentrations based upon equilibrium and kinetics-based models. Risk characterization for exposure with this mechanism is unavailable.
- The effect from exposure to dusts contaminated with the pesticide cannot be assessed generically as partitioning issues related to application site soils and chemical properties of the applied pesticides render the exposure potential from this route highly situation specific.
- Dermal exposure may occur through three potential sources: direct application of spray to terrestrial wildlife in the treated area or within the drift footprint, incidental contact with contaminated vegetation, or contact with contaminated water or soil. Interception of spray and incidental contact with treated substrates may pose risks to avian wildlife (Driver et al. 1991). However, available research related to wildlife dermal contact with pesticides is extremely limited, except dermal toxicity values are common for some mammals used as human surrogates (rats and mice). The EPA is currently evaluating protocols for modeling dermal exposure. Risk characterization may be underestimated for this route of exposure, particularly with high risk pesticides such as some organophosphates or carbamate insecticides. If protocols are established by the EPA for assessing dermal exposure to pesticides, they will be considered for incorporation into pesticide assessment protocols.
- Exposure to a pesticide may occur from consuming surface water, dew, or other water on treated surfaces. Water soluble pesticides have potential to dissolve in surface runoff, and puddles in a treated area may contain pesticide residues. Similarly, pesticides with lower organic carbon partitioning characteristics and higher solubility in water have a greater potential to dissolve in dew and other water associated with plant surfaces. Estimating the extent to which such pesticide loadings to drinking water occurs is complex and would depend upon the partitioning characteristics of the active ingredient, soils types in the treatment area, and the meteorology of the treatment area. In addition, the use of various water sources by wildlife is highly species-specific. Currently, risk characterization for this exposure mechanism is not available. The EPA

is actively developing protocols to quantify drinking water exposures from puddles and dew. If and when protocols are formally established by the EPA for assessing exposure to pesticides through drinking water, these protocols will be incorporated into pesticide risk assessment protocols.

- Risk assessments are based upon the assumption that the entire treatment area would be subject to pesticide application at the rates specified on the label. In most cases, there is potential for uneven application of pesticides through such plausible incidents such as changes in calibration of application equipment, spillage, and localized releases at specific areas in or near the treated field that are associated with mixing and handling and application equipment as well as applicator skill. Inappropriate use of pesticides and the occurrence of spills represent a potential underestimate of risk. It is likely not an important factor for risk characterization. All pesticide applicators are required to be certified by the state in which they apply pesticides. Certification training includes the safe storage, transport, handling, and mixing of pesticides, equipment calibration, and proper application with annual continuing education.
- The EPA relies on Fletcher (1994) for setting the assumed pesticide residues in wildlife dietary items. The EPA (2004) "believes that these residue assumptions reflect a realistic upper-bound residue estimate, although the degree to which this assumption reflects a specific percentile estimate is difficult to quantify." Fletcher's (1994) research suggests that the pesticide active ingredient residue assumptions used by the EPA represent a 95^{th} percentile estimate. However, research conducted by Pfleeger et al. (1996) indicates EPA residue assumptions for short grass was not exceeded. Behr and Habig (2000) compared EPA residue assumptions with distributions of measured pesticide residues for the EPA's UTAB database. Overall residue selection level will tend to overestimate risk characterization. This is particularly evident when wildlife individuals are likely to have selected a variety of food items acquired from multiple locations. Some food items may be contaminated with pesticide residues whereas others are not contaminated. However, it is important to recognize differences in species feeding behavior. Some species may consume whole above-ground plant material, but others will preferentially select different plant structures. Also, species may preferentially select a food item although multiple food items may be present. Without species-specific knowledge regarding foraging behavior, characterizing ecological risk other than in general terms is not possible.
- Acute and chronic risk assessments rely on comparisons of wildlife dietary residues with LC50 or NOEC values expressed as concentrations of pesticides in laboratory feed. These comparisons assume that ingestion of food items in the field occurs at rates commensurate with those in the laboratory. Although the screening assessment process adjusts dry-weight estimates of food intake to reflect the increased mass in fresh-weight wildlife food intake estimates, it does not allow for gross energy and assimilative efficiency differences between wildlife food items and laboratory feed. Differences in assimilative efficiency between laboratory and wild diets suggest that current screening assessment methods are not accounting for a potentially important aspect of food requirements.
- There are several other assumptions that can affect non-target species not considered in the risk assessment process. These include possible additive or synergistic effects from applying two or more pesticides or additives in a single application, co-location of pesticides in the environment, cumulative effects from pesticides with the same mode of action, effects of multiple stressors (e.g., combination of pesticide exposure, adverse abiotic and biotic factors) and behavioral changes induced by exposure to a pesticide. These factors may exist at some level contributing to adverse affects to non-target species, but they are usually characterized in the published literature in only a general manner limiting their value in the risk assessment process.
- It is assumed that aquatic species exclusively and permanently occupy the water body being assessed. Actual habitat requirements of aquatic species are not considered. With the possible exception of scenarios where pesticides are directly applied to water, it is assumed that no habitat

use considerations specific for any species would place the organisms in closer proximity to pesticide use sites. This assumption produces a maximum estimate of exposure or risk characterization. It would likely be realistic for many aquatic species that may be found in aquatic habitats within or in close proximity to treated terrestrial habitats. However, the spatial distribution of wildlife is usually not random because wildlife distributions are often related to habitat requirements of species. Clumped distributions of wildlife may result in an under- or over-estimation of risk depending upon where the initial pesticide concentration occurs relative to the species or species habitat.

- For species found in the water column, it would be assumed that the greatest bioavailable fraction of the pesticide active ingredient in surface waters is freely dissolved in the water column. Additional chemical exposure from materials associated with suspended solids or food items is not considered because partitioning onto sediments likely is minimal. Adsorption and bioconcentration occur at lower levels for many newer pesticides compared with older, more persistent bioaccumulative compounds. Pesticides with RQs close to the listed species level of concern, the potential for additional exposure from these routes may be a limitation of risk assessments, where potential pesticide exposure or risk may be underestimated.
- Mass transport losses of pesticide from a water body (except for losses by volatilization, degradation and sediment partitioning) would not be considered for ecological risk assessment. The water body would be assumed to capture all pesticide active ingredients entering as runoff, drift, and adsorbed to eroded soil particles. It would also be assumed that pesticide active ingredient is not lost from the water body by overtopping or flowthrough, nor is concentration reduced by dilution. In total, these assumptions would lead to a near maximum possible water-borne concentration. However, this assumption would not account for potential to concentrate pesticide through the evaporative loss. This limitation may have the greatest impact on water bodies with high surface-to-volume ratios such as ephemeral wetlands, where evaporative losses are accentuated and applied pesticides have low rates of degradation and volatilization.
- For acute risk assessments, there would be no averaging time for exposure. An instantaneous peak concentration would be assumed, where instantaneous exposure is sufficient in duration to elicit acute effects comparable to those observed over more protracted exposure periods (typically 48 to 96 hours) tested in the laboratory. In the absence of data regarding time-to-toxic event, analyses and latent responses to instantaneous exposure, risk would likely be overestimated.
- For chronic exposure risk assessments, the averaging times considered for exposure are commensurate with the duration of invertebrate life-cycle or fish-early life stage tests (e.g., 21-28 days and 56-60 days, respectively). Response profiles (time to effect and latency of effect) to pesticides likely vary widely with mode of action and species and should be evaluated on a case-by-case basis as available data allow. Nevertheless, because the EPA relies on chronic exposure toxicity endpoints based on a finding of no observed effect, the potential for any latent toxicity effects or averaging time assumptions to alter the results of an acceptable chronic risk assessment prediction is limited. The extent to which duration of exposure from water-borne concentrations overestimate or underestimate actual exposure depends on several factors. These include the following: localized meteorological conditions, runoff characteristics of the watershed (e.g., soils, topography), the hydrological characteristics of receiving waters, environmental fate of the pesticide active ingredient, and the method of pesticide application. It should also be understood that chronic effects studies are performed using a method that holds water concentration in a steady state. This method is not likely to reflect conditions associated with pesticide runoff. Pesticide concentrations in the field increase and decrease in surface water on a cycle influenced by rainfall, pesticide use patterns, and degradation rates. As a result of the dependency of this assumption on several undefined variables, risk associated with chronic exposure may in some situations underestimate risk and overestimate risk in others.

- There are several other factors that can affect non-target species not considered in the risk assessment process. These would include the following: possible additive or synergistic effects from applying two or more pesticides or additives in a single application, collocation of pesticides in the environment, cumulative effects from pesticides with the same mode of action, effects of multiple stressors (e.g., combination of pesticide exposure, adverse abiotic [not pesticides] and biotic factors), and sub-lethal effects such as behavioral changes induced by exposure to a pesticide. These factors may exist at some level contributing to adverse affects to non-target species, but they are not routinely assessed by regulatory agencies. Therefore, information on the factors is not extensive, limiting their value for the risk assessment process. As this type of information becomes available, it would be included, either quantitatively or qualitatively, in this risk assessment process.
- The EPA is required by the Food Quality Protection Act to assess the cumulative risks of pesticides that share common mechanisms of toxicity, or act the same within an organism. Currently, EPA has identified four groups of pesticides that have a common mechanism of toxicity requiring cumulative risk assessments. These four groups are the organophosphate insecticides, N-methyl carbamate insecticides, triazine herbicides, and chloroacetanilide herbicides.

E.7.3 Pesticide Mixtures and Degradates

Pesticide products are usually a formulation of several components generally categorized as active ingredients and inert or other ingredients. The term active ingredient is defined by the FIFRA as preventing, destroying, repelling, or mitigating the effects of a pest, or it is a plant regulator, defoliant, desiccant, or nitrogen stabilizer. In accordance with FIFRA, the active ingredient(s) must be identified by name(s) on the pesticide label along with its relative composition expressed in percentage(s) by weight. In contrast, inert ingredient(s) are not intended to affect a target pest. Their role in the pesticide formulation is to act as a solvent (keep the active ingredient is a liquid phase), an emulsifying or suspending agent (keep the active ingredient from separating out of solution), or a carrier such as clay in which the active ingredient is impregnated on the clay particle in dry formulations. For example, if isopropyl alcohol would be used as a solvent in a pesticide formulation, then it would be considered an inert ingredient. FIFRA only requires that inert ingredients identified as hazardous and associated percent composition, and the total percentage of all inert ingredients must be declared on a product label. Inert ingredients that are not classified as hazardous are not required to be identified.

The EPA (September 1997) issued Pesticide Regulation Notice 97-6, which encouraged manufacturers, formulators, producers, and registrants of pesticide products to voluntarily substitute the term “other ingredients” for “inert ingredients” in the ingredient statement. This change recognized that all components in a pesticide formulation potentially could elicit or contribute to an adverse effect on non-target organisms and, therefore, are not necessarily inert. Whether referred to as “inerts” or “other ingredients,” these constituents within a pesticide product have the potential to affect species or environmental quality. The EPA categorizes regulated inert ingredients into the following four lists (http://www.epa.gov/opprd001/inerts/index.html):

- List 1 – Inert Ingredients of Toxicological Concern
- List 2 – Potentially Toxic Inert Ingredients
- List 3 – Inerts of Unknown Toxicity
- List 4 – Inerts of Minimal Toxicity

Several of the List 4 compounds are naturally-occurring earthen materials (e.g., clay materials, simple salts) that would not elicit toxicological response at applied concentrations. However, some of the inerts

(particularly the List 3 compounds and unlisted compounds) may have moderate to high potential toxicity to aquatic species based on MSDSs or published data.

Comprehensively assessing potential effects to non-target fish, wildlife, plants, and/or their habitats from pesticide use is a complex task. It would be preferable to assess the cumulative effects from exposure to the active ingredient, its degradates, and inert ingredients, as well as other active ingredients in the spray mixture. However, it would only be feasible to conduct deterministic risk assessments for each component in the spray mixture singly. Limited scientific information is available regarding ecological effects (additive or synergistic) from chemical mixtures that typically rely upon broadly encompassing assumptions. For example, the U.S. Forest Service (2005) found that mixtures of pesticides used in land (forest) management likely would not cause additive or synergistic effects to non-target species based upon a review of scientific literature regarding toxicological effects and interactions of agricultural chemicals (ATSDR 2004, EPA-ORD 2000). Moreover, information on inert ingredients, adjuvants, and degradates is often limited by the availability of and access to reliable toxicological data for these constituents.

Toxicological information regarding "other ingredients" may be available from sources such as the following:

- TOMES (a proprietary toxicological database including EPA's IRIS, the Hazardous
- Substance Data Bank, the Registry of Toxic Effects of Chemical Substances [RTECS]).
- EPA's ECOTOX database, which includes AQUIRE (a database containing scientific papers published on the toxic effects of chemicals to aquatic organisms).
- TOXLINE (a literature searching tool).
- Material Safety Data Sheets (MSDSs) from pesticide suppliers.
- Other sources such as the Farm Chemicals Handbook.

Because there is a lack of specific inert toxicological data, inert(s) in a pesticide may cause adverse ecological effects. However, inert ingredients typically represent only a small percentage of the pesticide spray mixture; it would be assumed that negligible effects would be expected to result from inert ingredient(s).

Although the potential effects of degradates should be considered when selecting a pesticide, it is beyond the scope of this assessment process to consider all possible breakdown chemicals of the various product formulations containing an active ingredient. Degradates may be more or less mobile and more or less hazardous in the environment than their parent pesticides (Battaglin et al. 2003). Differences in environmental behavior (e.g., mobility) and toxicity between parent pesticides and degradates would make assessing potential degradate effects extremely difficult. For example, a less toxic and more mobile, bioaccumulative, or persistent degradate may have potentially greater effects on species and/or degrade environmental quality. The lack of data on the toxicity of degradates for many pesticides would represent a source of uncertainty for assessing risk.

An EPA-approved label specifies whether a product can be mixed with one or more pesticides. Without product-specific toxicological data, it would not possible to quantify the potential effects of these mixtures. In addition, a quantitative analysis could only be conducted if reliable scientific information allowed a determination of whether the joint action of a mixture would be additive, synergistic, or antagonistic. Such information would not likely exist unless the mode of action would be common among the chemicals and receptors. Moreover, the composition of and exposure to mixtures would be highly site- and/or time-specific and, therefore, it would be nearly impossible to assess potential effects to species and environmental quality.

To minimize or eliminate potential negative effects associated with applying two or more pesticides as a mixture, the use would be conducted in accordance with the labeling requirements. Labels for two or more pesticides applied as a mixture should be completely reviewed, where products with the least potential for negative effects would be selected for use on the refuge. This is especially relevant when a mixture would be applied in a manner that may already have the potential for an effect(s) associated with an individual pesticide (e.g., runoff to ponds in sandy watersheds). Use of a tank mix under these conditions would increase the level of uncertainty in terms of risk to species or potential to degrade environmental quality.

Adjuvants generally function to enhance or prolong the activity of pesticide. For terrestrial herbicides, adjuvants aid in the absorption into plant tissue. Adjuvant is a broad term that generally applies to surfactants, selected oils, anti-foaming agents, buffering compounds, drift control agents, compatibility agents, stickers, and spreaders. Adjuvants are not under the same registration requirements as pesticides and the EPA does not register or approve the labeling of spray adjuvants. Individual pesticide labels identify types of adjuvants approved for use with it. In general, adjuvants compose a relatively small portion of the volume of pesticides applied. Selection of adjuvants with limited toxicity and low volumes would be recommended to reduce the potential for the adjuvant to influence the toxicity of the pesticide.

E.7.4 Determining Effects to Soil and Water Quality

The approval process for pesticide uses would consider potential to degrade water quality on and off the refuge. A pesticide can only affect water quality through movement away from the treatment site. After application, pesticide mobilization can be characterized by one or more of the following (Kerle et al. 1996):

- Attach (sorb) to soil, vegetation, or other surfaces and remain at or near the treated area;
- Attach to soil and move off-site through erosion from run-off or wind;
- Dissolve in water that can be subjected to run-off or leaching.

As an initial screening tool, selected chemical characteristics and rating criteria for a pesticide can be evaluated to assess potential to enter ground and/or surface waters. These would include the following: persistence, sorption coefficient (Koc), groundwater ubiquity score (GUS), and solubility.

Persistence, which is expressed as half-life (t½), represents the length of time required for 50 percent of the deposited pesticide to degrade (completely or partially). Persistence in the soil can be categorized as the following: non-persistent less than 30 days, moderately persistent 30 to 100 days, and persistent less than 100 days (Kerle et al. 1996). Half-life data is usually available for aquatic and terrestrial environments.

Another measure of pesticide persistence is dissipation time (DT50). It represents the time required for 50 percent of the deposited pesticide to degrade and move from a treated site; whereas, half-life describes the rate for degradation only. As for half-life, units of dissipation time are usually expressed in days. Field or foliar dissipation time is the preferred data for use to estimate pesticide concentrations in the environment. However, soil half-life is the most common persistence data cited in the published literature. If field or foliar dissipation data is not available, soil half-life data may be used. The average or representative half-life value of most important degradation mechanism will be selected for quantitative analysis for both terrestrial and aquatic environments.

Mobility of a pesticide is a function of how strongly it is adsorbed to soil particles and organic matter, its solubility in water, and its persistence in the environment. Pesticides strongly adsorbed to soil particles, relatively insoluble in water, and not environmentally persistent wound be less likely to move across the soil surface into surface waters or to leach through the soil profile and contaminate groundwater.

Conversely, pesticides that are not strongly adsorbed to soil particles, are highly water soluble, and are persistent in the environment would have greater potential to move from the application site (off-site movement).

The degree of pesticide adsorption to soil particles and organic matter (Kerle et al. 1996) is expressed as the soil adsorption coefficient (Koc). The soil adsorption coefficient is measured as micrograms of pesticide per gram of soil (µg/g) that can range from near zero to the thousands. Pesticides with higher Koc values are strongly sorbed to soil and, therefore, would be less subject to movement.

Water solubility describes the amount of pesticide that will dissolve in a known quantity of water. The water solubility of a pesticide is expressed as milligrams of pesticide dissolved in a liter of water (mg/l or ppm). Pesticides with solubility less than 0.1 ppm are virtually insoluble in water, 100-1,000 ppm are moderately soluble, and greater than 10,000 ppm highly soluble (U.S. Geological Survey 2000). As pesticide solubility increases, there would be greater potential for off-site movement.

The Groundwater Ubiquity Score (GUS) is a quantitative screening tool to estimate a pesticide's potential to move in the environment. It utilizes soil persistence and adsorption coefficients in the following formula.

$$GUS = \log10 (t½) \times [4 - \log10 (Koc)]$$

The potential pesticide movement rating would be based upon its GUS value. Pesticides with a GUS less than 0.1 would be considered to have an extremely low potential to move toward groundwater. Values of 1.0-2.0 would be low, 2.0-3.0 would be moderate, 3.0-4.0 would be high, and greater than 4.0 would have a very high potential to move toward groundwater.

Water solubility describes the amount of pesticide dissolving in a specific quantity of water, where it is usually measured as mg/l or parts per million (ppm). Solubility is useful as a comparative measure because pesticides with higher values are more likely to move by runoff or leaching. The GUS, water solubility, t½, and Koc values are available for selected pesticides from the Oregon State University Extension Pesticide Properties Database at http://npic.orst.edu/ppdmove.htm. Many of the values in this database were derived from the SCS/ARS/CES Pesticide Properties Database for Environmental Decision Making (Wauchope et al.1992).

Soil properties influence the fate of pesticides in the environment. The following six properties are mostly likely to affect pesticide degradation and the potential for pesticides to move off-site by leaching (vertical movement through the soil) or runoff (lateral movement across the soil surface).

- Permeability is the rate of water movement vertically through the soil. It is affected by soil texture and structure. Coarse textured soils (e.g., high sand content) have a larger pore size and they are generally more permeable than fine textured soils (i.e., high clay content). The more permeable soils would have a greater potential for pesticides to move vertically down through the soil profile. Soil permeability rates (inches/hour) are usually available in county soil survey reports.
- Soil texture describes the relative percentage of sand, silt, and clay. In general, greater clay content with smaller pore size would lower the likelihood and rate at which water would move through the soil profile. Clay also serves to adsorb (bind) pesticides to soil particles. Soils with high clay content would adsorb more pesticide than soils with relatively low clay content. In contrast, sandy soils with coarser texture and lower water holding capacity would have a greater potential for water to leach through them.

- Soil structure describes soil aggregation. Soils with a well developed soil structure have looser, more aggregated, structure that would be less likely to be compacted. Both characteristics would allow for less restricted flow of water through the soil profile resulting in greater infiltration.
- Organic matter would be the single most important factor affecting pesticide adsorption in soils. Many pesticides are adsorbed to organic matter which would reduce their rate of downward movement through the soil profile. Also, soils high in organic matter would tend to hold more water, which may make less water available for leaching.
- Soil moisture affects how fast water would move through the soil. If soils are already wet or saturated before rainfall or irrigation, excess moisture would runoff rather than infiltrate into the soil profile. Soil moisture also would influence microbial and chemical activity in soil, which effects pesticide degradation.
- Soil pH would influence chemical reactions that occur in the soil, which in turn determines whether or not a pesticide will degrade, rate of degradation, and, in some instances, which degradation products are produced.

Based upon the aforementioned properties, soils most vulnerable to groundwater contamination would be sandy soils with low organic matter. In contrast, the least vulnerable soils would be well-drained clayey soils with high organic matter. Consequently, pesticides with the lowest potential for movement in conjunction with appropriate BMPs (see below) would be used in an IPM framework to treat pests while minimizing effects to non-target biota and protecting environmental quality.

Along with soil properties, the potential for a pesticide to affect water quality through run-off and leaching would consider site-specific environmental and abiotic conditions including rainfall, water table conditions, and topography (Huddleston 1996).

- Water is necessary to separate pesticides from soil. This can occur in two basic ways. Pesticides that are soluble move easily with runoff water. Pesticide-laden soil particles can be dislodged and transported from the application site in runoff. The concentration of pesticides in the surface runoff would be greatest for the first runoff event following treatment. The rainfall intensity and route of water infiltration into soil, to a large extent, determine pesticide concentrations and losses in surface runoff. The timing of the rainfall after application also would have an effect. Rainfall interacts with pesticides at a shallow soil depth (¼ to ½ inch), which is called the mixing zone (Baker and Miller 1999). The pesticide/water mixture in the mixing zone would tend to leach down into the soil or runoff depending upon how quickly the soil surface becomes saturated and how rapidly water can infiltrate into the soil. Leaching would decrease the amount of pesticide available near the soil surface (mixing zone) to runoff during the initial rainfall event following application and subsequent rainfall events.
- Terrain slope would affect the potential for surface runoff and the intensity of runoff. Steeper slopes would have greater potential for runoff following a rainfall event. In contrast, soils that are relatively flat would have little potential for runoff, except during intense rainfall events. In addition, soils in lower areas would be more susceptible to leaching as a result of receiving excessive water from surrounding higher elevations.
- Depth to groundwater would be an important factor affecting the potential for pesticides to leach into groundwater. If the distance from the soil surface to the top of the water table is shallow, pesticides would have less distance to travel to reach groundwater. Shallower water tables that persist for longer periods would be more likely to experience groundwater contamination. Soil survey reports are available for individual counties. These reports provide data in tabular format regarding the water table depths and the months during which it is persists. In some situations, a hard pan exists above the water table that would prevent pesticide contamination from leaching.

E.7.5 Determining Effects to Air Quality

Pesticides may volatilize from soil and plant surfaces and move from the treated area into the atmosphere. The potential for a pesticide to volatilize is determined by the pesticide's vapor pressure which would be affected by temperature, sorption, soil moisture, and the pesticide's water solubility. Vapor pressure is often expressed in mm Hg. To make these numbers easier to compare, vapor pressure may be expressed in exponent form (I x 10-7), where I represents a vapor pressure index. In general, pesticides with I less than10 would have a low potential to volatilize; whereas, pesticides with I greater than 1,000 would have a high potential to volatilize (Oregon State University 1996). Vapor pressure values for pesticides are usually available in the pesticide product MSDS or the USDA Agricultural Research Service (ARS) pesticide database.

E.7.6 Preparing a Chemical Profile

The following instructions would be used by Service personnel to complete Chemical Profiles for pesticides. Specifically, profiles would be prepared for pesticide active ingredients (e.g., glyphosate, imazapic) that would be contained in one or more trade name products that are registered and labeled with EPA. All information fields under each category (e.g., Toxicological Endpoints, Environmental Fate) would be completed for a Chemical Profile. If no information is available for a specific field, then "No data is available in references" would be recorded in the profile. Available scientific information would be used to complete Chemical Profiles. Each entry of scientific information would be shown with applicable references.

Completed Chemical Profiles would provide a structured decision-making process utilizing quantitative assessment/screening tools with threshold values (where appropriate) that would be used to evaluate potential biological and other environmental effects to refuge resources. For ecological risk assessments presented in these profiles, the "worst-case scenario" would be evaluated to determine whether a pesticide could be approved for use considering the maximum single application rate specified on pesticide labels for habitat management and croplands/facilities maintenance treatments pertaining to refuges. Where the "worst-case scenario" likely would only result in minor, temporary, and localized effects to listed and non-listed species with appropriate BMPs (see Section 5.0), the proposed pesticide's use in a PUP would have a scientific basis for approval under any application rate specified on the label that is at or below rates evaluated in a Chemical Profile. In some cases, the Chemical Profile would include a lower application rate than the maximum labeled rate in order to protect refuge resources. As necessary, Chemical Profiles would be periodically updated with new scientific information or as pesticides with the same active ingredient are proposed for use on the refuge in PUPs.

Throughout this section, threshold values (to prevent or minimize potential biological and environmental effects) would be clearly identified for specific information presented in a completed Chemical Profile. Comparison with these threshold values provides an explicit scientific basis to approve or disapprove PUPs for habitat management and cropland/facilities maintenance on the refuge. In general, PUPs would be approved for pesticides with Chemical Profiles where there would be no exceedances of threshold values. However, BMPs are identified for some screening tools that would minimize/eliminate potential effects (exceedance of the threshold value) as a basis for approving PUPs.

E.7.6.1 Date

Service personnel would record the date when the Chemical Profile is completed or updated. Chemical Profiles (e.g., currently approved pesticide use patterns) would be periodically reviewed and updated, as necessary. The most recent review date would be recorded on a profile to document when it was last updated.

E.7.6.2 Trade Name(s)

Service personnel would accurately and completely record the trade name(s) from the pesticide label, which includes a suffix that describes the formulation (e.g., WP, DG, EC, L, SP, I, II or 64). The suffix often distinguishes a specific product among several pesticides with the same active ingredient. Service personnel would record a trade name for each pesticide product with the same active ingredient.

E.7.6.3 Common chemical name(s)

Service personnel would record the common name(s) listed on the pesticide label or material safety data sheet (MSDS) for an active ingredient. The common name of a pesticide is listed as the active ingredient on the title page of the product label immediately following the trade name, and the MSDS, Section 2: Composition/Information on Ingredients. A Chemical Profile is completed for each active ingredient.

E.7.6.4 Pesticide Type

Service personnel would record the type of pesticide for an active ingredient as one of the following: herbicide, dessicant, fungicide, fumigant, growth regulator, insecticide, pisicide, or rodenticide.

E.7.6.5 EPA Registration Number(s)

This number (EPA Reg. No.) appears on the title page of the label and MSDS, Section 1: Chemical Product and Company Description. It is not the EPA Establishment Number that is usually located near it. Service personnel would record the EPA Reg. No. for each trade name product with an active ingredient based upon PUPs.

E.7.6.6 Pesticide Class

Service personnel would list the general chemical class for the pesticide (active ingredient). For example, malathion is an organophosphate and carbaryl is a carbamate.

E.7.6.7 CAS (Chemical Abstract Service) Number

This number is often located in the second section (Composition/Information on Ingredients) of the MSDS. The MSDS table listing components usually contains this number immediately prior to or following the percent composition.

E.7.6.8 Other Ingredients

From the most recent MSDS for the proposed pesticide product(s), Service personnel would include any chemicals in the pesticide formulation not listed as an active ingredient that are described as toxic or hazardous, or regulated under the Superfund Amendments and Reauthorization Act (SARA), Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Toxic Substances Control Act (TSCA), Occupational Safety and Health Administration (OSHA), State Right-to-Know, or other listed authorities. These are usually found in MSDS sections titled “Hazardous Identifications,” “Exposure Control/Personal Protection,” and “Regulatory Information.” If concentrations of other ingredients are available for any compounds identified as toxic or hazardous, then Service personnel would record this information in the Chemical Profile by trade name. MSDS(s) may be obtained from the manufacturer, manufacturer’s website or from an online database maintained by Crop Data Management Systems, Inc. (see list below).

E.7.6.9 Toxicological Endpoints

Toxicological endpoint data would be collected for acute and chronic tests with mammals, birds,and fish. Data would be recorded for species available in the scientific literature. If no data are found for a particular taxonomic group, then "No data available in references" would be recorded as the data entry. Throughout the Chemical Profile, references (including toxicological endpoint data) would be cited using parentheses (#) following the recorded data.

E.7.6.10 Mammalian LD50

For test species in the scientific literature, Service personnel would record available data for oral lethal dose (LD50) in mg/kg-bw (body weight) or ppm-bw. Most common test species in scientific literature are the rat and mouse. The lowest LD50 value found for a rat would be used as a toxicological endpoint for dose-based RQ calculations to assess acute risk to mammals (see Table 1 in Section 7.1).

E.7.6.11 Mammalian LC50

For test species in the scientific literature, Service personnel would record available data for dietary lethal concentration (LC50) as reported (e.g., mg/kg-diet or ppm-diet). Most common test species in scientific literature are the rat and mouse. The lowest LC50 value found for a rat would be used as a toxicological endpoint for diet-based RQ calculations to assess acute risk (see Table 1 in Section 7.1).

E.7.6.12 Mammalian Reproduction

For test species listed in the scientific literature, Service personnel would record the test results (e.g., Lowest Observed Effect Concentration [LOEC], Lowest Observed Effect Level [LOEL], No Observed Adverse Effect Level [NOAEL], No Observed Adverse Effect Concentration [NOAEC]) in mg/kg-bw or mg/kg-diet for reproductive test procedure(s) (e.g., generational studies [preferred], fertility, newborn weight). Most common test species available in scientific literature are rats and mice. The lowest NOEC, NOAEC, NOEL, or NOAEL test results found for a rat would be used as a toxicological endpoint for RQ calculations to assess chronic risk (see Table 1 in Section 7.1).

E.7.6.13 Avian LD50

For test species available in the scientific literature, Service personnel would record values for oral lethal dose (LD50) in mg/kg-bw or ppm-bw. Most common test species available in scientific literature are the bobwhite quail and mallard. The lowest LD50 value found for an avian species would be used as a toxicological endpoint for dose-based RQ calculations to assess acute risk (see Table 1 in Section 7.1).

E.7.6.14 Avian LC50

For test species available in the scientific literature, Service personnel would record values for dietary lethal concentration (LC50) as reported (e.g., mg/kg-diet or ppm-diet). Most common test species available in scientific literature are the bobwhite quail and mallard. The lowest LC50 value found for an avian species would be used as a toxicological endpoint for dietary-based RQ calculations to assess acute risk (see Table 1 in Section 7.1).

E.7.6.15 Avian Reproduction

For test species available in the scientific literature, Service personnel would record test results

(e.g., LOEC, LOEL, NOAEC, NOAEL) in mg/kg-bw or mg/kg-diet consumed for reproductive test procedure(s) (e.g., early life cycle, reproductive). Most common test species available in scientific literature are the bobwhite quail and mallard. The lowest NOEC, NOAEC, NOEL, or NOAEL test results found for an avian species would be used as a toxicological endpoint for RQ calculations to assess chronic risk (see Table 1 in Section 7.1).

E.7.6.16 Fish LC50

For test freshwater or marine species listed in the scientific literature, Service personnel would record a LC50 in ppm or mg/L. Most common test species available in the scientific literature are the bluegill, rainbow trout, and fathead minnow (marine). Test results for many game species may also be available. The lowest LC50 value found for a freshwater fish species would be used as a toxicological endpoint for RQ calculations to assess acute risk (see Table 1 in Section 7.1).

E.7.6.17 Fish Early Life Stage (ELS)/Life Cycle

For test freshwater or marine species available in the scientific literature, Service personnel would record test results (e.g., LOEC, NOAEL, NOAEC, LOAEC) in ppm for test procedure(s) (e.g., early life cycle, life cycle). Most common test species available in the scientific literature are bluegill, rainbow trout, and fathead minnow. Test results for other game species may also be available. The lowest test value found for a fish species (preferably freshwater) would be used as a toxicological endpoint for RQ calculations to assess chronic risk (see Table 1 in Section 7.1).

E.7.6.18 Other

For test invertebrate as well as non-vascular and vascular plant species available in the scientific literature, Service personnel would record LC50, LD50, LOEC, LOEL, NOAEC, NOAEL, or EC50 (environmental concentration) values in ppm or mg/L. Most common test invertebrate species available in scientific literature are the honey bee and the water flea (*Daphnia magna*). Green algae (*Selenastrum capricornutum*) and pondweed (*Lemna minor*) are frequently available test species for aquatic nonvascular and vascular plants, respectively.

E.7.7 Ecological Incident Reports

After a site has been treated with pesticide(s), wildlife may be exposed to these chemical(s). When exposure is high relative to the toxicity of the pesticides, wildlife may be killed or visibly harmed (incapacitated). Such events are called ecological incidents. The EPA maintains a database (Ecological Incident Information System) of ecological incidents. This database stores information extracted from incident reports submitted by various Federal and state agencies and non-government organizations. Information included in an incident report is date and location of the incident, type and magnitude of affects observed in various species, use(s) of pesticides known or suspected of contributing to the incident, and results of any chemical residue and cholinesterase activity analyses conducted during the investigation.

Incident reports can play an important role in evaluating the effects of pesticides by supplementing quantitative risk assessments. All incident reports for pesticide(s) with the active ingredient and associated information would be recorded.

E.7.8 Environmental Fate

E.7.8.1 Water Solubility

Service personnel would record values for water solubility (Sw), which describes the amount of pesticide that dissolves in a known quantity of water. Sw is expressed as mg/L (ppm). Pesticide Sw values would be categorized as one of the following: insoluble less than 0.1 ppm, moderately soluble = 100 to 1,000 ppm, highly soluble greater than 10,000 ppm (U.S. Geological Survey 2000). As pesticide Sw increases, there would be greater potential to degrade water quality through runoff and leaching. Sw would be used to evaluate potential for bioaccumulation in aquatic species [see Octanol-Water Partition Coefficient (Kow) below].

E.7.8.2 Soil Mobility

Service personnel would record available values for soil adsorption coefficient (Koc [µg/g]). It provides a measure of a chemical's mobility and leaching potential in soil. Koc values are directly proportional to organic content, clay content, and surface area of the soil. Koc data for a pesticide may be available for a variety of soil types (e.g., clay, loam, sand). Koc values would be used in evaluating the potential to degrade groundwater by leaching (see Potential to Move to Groundwater below).

E.7.8.3 Soil Persistence

Service personnel would record values for soil half-life (t½), which represents the length of time (days) required for 50 percent of the deposited pesticide to degrade (completely or partially) in the soil. Based upon the t½ value, soil persistence would be categorized as one of the following: non-persistent less than 30 days, moderately persistent 30 to 100 days, and persistent greater than 100 days (Kerle et al. 1996).

Threshold for Approving PUPs:

If soil t½ 100 days or less, then a PUP would be approved without additional BMPs to protect water quality.

If soil t½ is greater than 100 days, then a PUP would only be approved with additional BMPs specifically to protect water quality. One or more BMPs such as the following would be included in the Specific Best Management Practices (BMPs) section *to minimize potential surface run-off and leaching that can degrade water quality:*

- *Do not exceed one application per site per year.*
- *Do not use on coarse-textured soils where the groundwater table is less than 10 feet and average annual precipitation greater than 12 inches.*
- *Do not use on steep slopes if substantial rainfall is expected within 24 hours or ground is saturated.*

Along with Koc, soil t½ values would be used in evaluating the potential to degrade groundwater by leaching (see Potential to Move to Groundwater below).

E.7.8.4 Soil Dissipation

Dissipation time (DT50) represents the time required for 50 percent of the deposited pesticide to degrade and move from a treated site; whereas, soil t½ describes the rate for degradation only. As for t½, units of dissipation time are usually expressed in days. Field dissipation time would be the preferred data for use to estimate pesticide concentrations in the environment because it is based upon field studies compared to soil t½, which is derived in a laboratory. However, soil t½ is the most common persistence data available in the published literature. If field dissipation data is not available, soil half-life data would be used in a Chemical Profile. The average or representative half-life value of most important degradation mechanism would be selected for quantitative analysis for both terrestrial and aquatic environments.

Based upon the DT50 value, environmental persistence in the soil also would be categorized as one of the following: non-persistent less than 30 days, moderately persistent 30 to 100 days, and persistent more than 100 days.

Threshold for Approving PUPs:

If soil DT50 is 100 days or less, then a PUP would be approved without additional BMPs to protect water quality.
If soil DT50 is greater than 100 days, then a PUP would only be approved with additional BMPs specifically to protect water quality. One or more BMPs such as the following would be included in the Specific Best Management Practices (BMPs) section *to minimize potential surface run-off and leaching that can degrade water quality:*

- *Do not exceed one application per site per year.*
- *Do not use on coarse-textured soils where the ground water table is less than 10 feet and average annual precipitation is greater than 12 inches.*
- *Do not use on steep slopes if substantial rainfall is expected within 24 hours or ground is saturated.*

Along with Koc, soil DT50 values (preferred over soil t½) would be used in evaluating the potential to degrade groundwater by leaching (see Potential to Move to Groundwater below), if available.

E.7.8.5 Aquatic Persistence

Service personnel would record values for aquatic t½, which represents the length of time required for 50 percent of the deposited pesticide to degrade (completely or partially) in water. Based upon the t½ value, aquatic persistence would be categorized as one of the following: nonpersistent less than 30 days, moderately persistent 30 to 100 days, and persistent more than 100 days (Kerle et al. 1996).

Threshold for Approving PUPs:

If aquatic t½ is 100 days or less, then a PUP would be approved without additional BMPs to protect water quality.
If aquatic t½ is more than 100 days, then a PUP would only be approved with additional BMPs specifically to protect water quality. One or more BMPs such as the following would be included in the Specific Best Management Practices (BMPs) section *to minimize potential surface run-off and leaching that can degrade water quality:*

- *Do not exceed one application per site per year.*
- *Do not use on coarse-textured soils where the ground water table is less than 10 feet and average annual precipitation is more than 12 inches.*
- *Do not use on steep slopes if substantial rainfall is expected within 24 hours or ground is saturated.*

E.7.8.6 Aquatic Dissipation

Dissipation time (DT50) represents the time required for 50 percent of the deposited pesticide to degrade or move (dissipate); whereas, aquatic t½ describes the rate for degradation only. As for t½, units of dissipation time are usually expressed in days. Based upon the DT50 value, environmental persistence in aquatic habitats also would be categorized as one of the following: non-persistent less than 30 days, moderately persistent 30 to 100 days, and persistent more than 100 days.

Threshold for Approving PUPs:

If aquatic DT50 is 100 days or less, then a PUP would be approved without additional BMPs to protect water quality.
If aquatic DT50 is more than 100 days, then a PUP would only be approved with additional BMPs specifically to protect water quality. One or more BMPs such as the following would be included in the Specific Best Management Practices (BMPs) section *to minimize potential surface run-off and leaching that can degrade water quality:*

- *Do not exceed one application per site per year.*
- *Do not use on coarse-textured soils where the groundwater table is less than 10 feet and average annual precipitation is greater than 12 inches.*
- *Do not use on steep slopes if substantial rainfall is expected within 24 hours or ground is saturated.*

E.7.8.7 Potential to Move to Groundwater

Groundwater Ubiquity Score (GUS) = log10(soil t ½) x [4 – log10(Koc)]. If a DT50 value is available, it would be used rather than a t ½ value to calculate a GUS score. Based upon the GUS value, the potential to move toward groundwater would be recorded as one of the following categories: extremely low potential less than 1.0, low-1.0 to 2.0, moderate-2.0 to 3.0, high-3.0 to 4.0, or very high more than 4.0.

Threshold for Approving PUPs:

If GUS is 4.0 or less, then a PUP would be approved without additional BMPs to protect water quality.
If GUS is more than 4.0, then a PUP would only be approved with additional BMPs specifically to protect water quality. One or more BMPs such as the following would be included in the Specific Best Management Practices (BMPs) section *to minimize potential surface run-off and leaching that can degrade water quality:*

- *Do not exceed one application per site per year.*
- *Do not use on coarse-textured soils where the ground water table is less than 10 feet and average annual precipitation is greater than 12 inches.*
- *Do not use on steep slopes if substantial rainfall is expected within 24 hours or ground is saturated.*

E.7.8.8 Volatilization

Pesticides may volatilize (evaporate) from soil and plant surfaces and move off-target into the atmosphere. The potential for a pesticide to volatilize is a function of its vapor pressure that is affected by temperature, sorption, soil moisture, and the pesticide's water solubility. Vapor pressure is often expressed in mm Hg. To make these values easier to compare, vapor pressure would be recorded by Service personnel in exponential form (I x 10-7), where I represents a vapor pressure index. In general, pesticides with I less than 10 would have low potential to volatilize; whereas, pesticides with I greater than 1,000 would have a high potential to volatilize (Oregon State University 1996). Vapor pressure values for pesticides are usually available in the pesticide product MSDS or the USDA Agricultural Research Service (ARS) pesticide database (see References).

Threshold for Approving PUPs:

If I is 1,000 or less, then a PUP would be approved without additional BMPs to minimize drift and protect air quality.

If I is more than 1,000, then a PUP would only be approved with additional BMPs specifically to minimize drift and protect air quality. One or more BMPs such as the following would be included in the Specific Best Management Practices (BMPs) section *to reduce volatilization and potential to drift and degrade air quality:*

- *Do not treat when wind velocities are less than 2 mph or more than 10 mph with existing or potential inversion conditions.*
- *Apply the large-diameter droplets possible for spray treatments.*
- *Avoid spraying when air temperatures are higher than 85oF.*
- *Use the lowest spray height possible above target canopy.*

E.7.8.9 Octanol-Water Partition Coefficient (Kow)

The octanol-water partition coefficient (Kow) is the concentration of a pesticide in octanol and water at equilibrium at a specific temperature. Because octanol is an organic solvent, it is considered a surrogate for natural organic matter. Therefore, Kow would be used to assess potential for a pesticide to bioaccumulate in tissues of aquatic species (e.g., fish). If Kow is greater than 1,000 or Sw is less than 1 mg/L AND soil t½ is greater than 30 days, then there would be high potential for a pesticide to bioaccumulate in aquatic species such as fish (U.S. Geological Survey 2000).

Threshold for Approving PUPs:

If there is not a high potential for a pesticide to bioaccumulate in aquatic species, then the PUP would be approved.
If there is a high potential to bioaccumulate in aquatic species (Kow greater than 1,000 or Sw less than 1 mg/L AND soil t½ is greater than 30 days), then the PUP would not be approved, except under unusual circumstances where approval would only be granted by the Washington Office.

E.7.8.10 Bioaccumulation/Bioconcentration

Bioconcentration is the physiological process where pesticide concentrations in tissue would increase in biota because they are taken and stored at a faster rate than they are metabolized or excreted. The potential for bioaccumulation would be evaluated through bioaccumulation factors (BAFs) or bioconcentration factors (BCFs). Based upon BAF or BCF values, the potential to bioaccumulate would be recorded as one of the following: low–0 to 300, moderate–300 to 1,000, or high greater than 1,000 (Calabrese and Baldwin 1993).

Threshold for Approving PUPs:

If BAF or BCF is 1,000 or less, then a PUP would be approved without additional BMPs.
If BAF or BCF is greater than 1,000, then a PUP would not approved, except under unusual circumstances where approval would only be granted by the Washington Office.

E.7.9 Worst-Case Ecological Risk Assessment

E.7.9.1 Max Application Rates (acid equivalent)

Service personnel would record the highest application rate of an active ingredient (ae basis) for habitat management and cropland/facilities maintenance treatments in this data field of a Chemical Profile. These rates can be found in Table CP.1 under the column heading “Max Product Rate–Single Application (lbs/acre–AI on acid equiv basis)”. This table would be prepared for a chemical profile from information

specified in labels for trade name products identified in PUPs. If these data are not available in pesticide labels, then write "NS" for "not specified on label" in this table.

E.7.9.2 EECs

An estimated environmental concentration (ECC) represents potential exposure to fish and wildlife (birds and mammals) from using a pesticide. EECs would be derived by Service personnel using an EPA screening-level approach (EPA 2004). For each max application rate [see description under Max Application Rates (acid equivalent)], Service personnel would record 2 EEC values in a Chemical Profile; these would represent the worst-case terrestrial and aquatic exposures for habitat management and croplands/facilities maintenance treatments. For terrestrial and aquatic EEC calculations, see description for data entry under Presumption of Unacceptable Risk/Risk Quotients, which is the next field for a Chemical Profile.

E.7.9.3 Presumption of Unacceptable Risk/Risk Quotients

Service personnel would calculate and record acute and chronic risk quotients (RQs) for birds, mammals, and fish using the provided tabular formats for habitat management and/or cropland/facilities maintenance treatments. RQs recorded in a Chemical Profile would represent the worst-case assessment for ecological risk. See Section 7.2 for discussion regarding the calculations of RQs.

For aquatic assessments associated with habitat management treatments, RQ calculations would be based upon selected acute and chronic toxicological endpoints for fish and the EEC would be derived from Urban and Cook (1986) assuming 100 percent overspray to an entire 1-foot deep water body using the max application rate (ae basis [see above]).

For aquatic assessments associated with cropland/facilities maintenance treatments, RQ calculations would be done by Service personnel based upon selected acute and chronic toxicological endpoints for fish and an EEC would be derived from the aquatic assessment in AgDRIFT® model version 2.01 under Tier I ground-based application with the following input variables: max application rate (acid basis [see above]), low boom (20 inches), fine to medium/coarse droplet size, 20 swaths, EPA-defined wetland, and 25-foot distance (buffer) from treated area to water.

See Section 7.2.1.2 for more details regarding the calculation of EECs for aquatic habitats for habitat management and cropland/facilities maintenance treatments.

For terrestrial avian and mammalian assessments, RQ calculations would be done by Service personnel based upon dietary exposure, where the "short grass" food item category would represent the worst-case scenario. For terrestrial spray applications associated with habitat management and cropland/facilities maintenance treatments, exposure (EECs and RQs) would be determined using the Kanaga nomogram method through the EPA's Terrestrial Residue Exposure model (T-REX) version 1.2.3. T-REX input variables would include the following: max application rate (acid basis [see above]) and pesticide half-life (days) in soil to estimate the initial, maximum pesticide residue concentration on general food items for terrestrial vertebrate species in short (shorter than 20 cm tall) grass.

For granular pesticide formulations and pesticide-treated seed with a unique route of exposure for terrestrial avian and mammalian wildlife, see Section 7.2.1.1.2 for the procedure that would be used to calculate RQs.

All calculated RQs in both tables would be compared with Levels of Concern (LOCs) established by EPA (see Table 2 in Section 7.2). If a calculated RQ exceeds an established LOC value (in brackets inside the

table), then there would be a potential for an acute or chronic effect (unacceptable risk) to federally listed (T&E) species and nonlisted species. See Section 7.2 for detailed descriptions of acute and chronic RQ calculations and comparison to LOCs to assess risk.
Threshold for approving PUPs:

If RQs are less than or equal to LOCs, then a PUP would be approved without additional BMPs.
If RQs are greater than LOCs, then a PUP would only be approved with additional BMPs specifically to minimize exposure (ecological risk) to bird, mammal, and/or fish species. One or more BMPs such as the following would be included in the Specific Best Management Practices (BMPs) section *to reduce potential risk to nonlisted or listed species:*

- *Lower application rate and/or fewer number of applications to RQs less than or equal to LOCs*
- *For aquatic assessments (fish) associated with cropland/facilities maintenance, increase the buffer distance beyond 25 feet so RQs less than or equal to LOCs.*

E.7.9.4 Justification for Use

Service personnel would describe the reason for using the pesticide based control of specific pests or groups of pests. In most cases, the pesticide label will provide the appropriate information regarding control of pests to describe in the section.

E.7.9.5 Specific Best Management Practices (BMPs)

Service personnel would record specific BMPs necessary to minimize or eliminate potential effects to non-target species and/or degradation of water quality from drift, surface runoff, or leaching. These BMPs would be based upon scientific information documented in previous data fields of a Chemical Profile. Where necessary and feasible, these specific practices would be included in PUPs as a basis for approval.

If there are no specific BMPs that are appropriate, Service personnel would describe why the potential effects to refuge resources and/or degradation of environmental quality is outweighed by the overall resource benefit(s) from the proposed pesticide use in the BMP section of the PUP. See Section 4.0 of this document for a complete list of BMPs associated with mixing and applying pesticides appropriate for all PUPs with ground-based treatments that would be additive to any necessary, chemical-specific BMPs.

E.7.9.6 Data Resources

Service personnel would record scientific resources used to provide data/information for a chemical profile. Use the number sequence to uniquely reference data in a chemical profile. The following on-line data resources are readily available for toxicological endpoint and environmental fate data for pesticides:

1. California Product/Label Database. Department of Pesticide Regulation, California Environmental Protection Agency. (http://www.cdpr.ca.gov/docs/label/labelque.htm#regprods)

2. ECOTOX database. Office of Pesticide Programs, US Environmental Protection Agency, Washington, DC. (http://cfpub.epa.gov/ecotox/)

3. Extension Toxicology Network (EXTOXNET) Pesticide Information Profiles. Cooperative effort of University of California-Davis, Oregon State University, Michigan State University, Cornell University and University of Idaho through Oregon State University, Corvallis, Oregon. (http://extoxnet.orst.edu/pips/ghindex.html)

4. FAO specifications and evaluations for plant protection products. Pesticide Management Unit, Plant Protection Services, Food and Agriculture Organization, United Nations. (http://www.fao.org/WAICENT/FAOINFO/AGRICULT/AGP/AGPP/Pesticid/)
5. Human health and ecological risk assessments. Pesticide Management and Coordination, Forest Health Protection, US Department of Agriculture, US Forest Service. (http://www.fs.fed.us/foresthealth/pesticide/risk.htm)

6. Pesticide Chemical Fact Sheets. Clemson University Pesticide Information Center. (http://entweb.clemson.edu/pesticid/Document/Labels/factshee.htm)

7. Pesticide Fact Sheets. Published by Information Ventures, Inc. for Bureau of Land Management, Dept. of the Interior; Bonneville Power Administration, U.S. Dept. of Energy; and Forest Service, US Department of Agriculture. (http://infoventures.com/e-hlth/pesticide/pestfac.html)

8. Pesticide Fact Sheets. National Pesticide Information Center. (http://npic.orst.edu/npicfact.htm)

9. Pesticide Fate Database. US Environmental Protection Agency, Washington, DC. (http://cfpub.epa.gov/pfate/home.cfm).

10. Pesticide product labels and material safety data sheets. Crop Data Management Systems, Inc. (CDMS) (http://www.cdms.net/pfa/LUpdateMsg.asp) or multiple websites maintained by agrichemical companies.

11. Registered Pesticide Products (Oregon database). Oregon Department of Agriculture. (http://www.oda.state.or.us/dbs/pest_products/search.lasso)

12. Regulatory notes. Pest Management Regulatory Agency, Health Canada, Ontario, Canada. (http://www.hc-sc.gc.ca/pmra-arla/)

13. Reptile and Amphibian Toxicology Literature. Canadian Wildlife Service, Environment Canada, Ontario, Canada. (http://www.cws-scf.ec.gc.ca/nwrc-cnrf/ratl/index_e.cfm)

14. Specific Chemical Fact Sheet – New Active Ingredients, Biopesticide Fact Sheet and Registration Fact Sheet. U.S Environmental Protection Agency, Washington, DC. (http://www.epa.gov/pestidides/factsheets/chemical_fs.htm)

15. Weed Control Methods Handbook: Tools and Techniques for Use in Natural Areas. The Invasive Species Initiative. The Nature Conservancy. (http://tnsweeds.ucdavis.edu/handbook.html)

16. Wildlife Contaminants Online. US Geological Survey, Department of Interior, Washington, D.C. (http://www.pwrc.usgs.gov/contaminants-online/)

17. One-liner database. 2000. US Environmental Protection Agency, Office of Pesticide Programs, Washington, D.C.

Chemical Profile

Date:			
Trade Name(s):		**Common Chemical Name(s):**	
Pesticide Type:		**EPA Registration Number:**	
Pesticide Class:		**CAS Number:**	
Other Ingredients:			

Toxicological Endpoints

Mammalian LD_{50}:	
Mammalian LC_{50}:	
Mammalian Reproduction:	
Avian LD_{50}:	
Avian LC_{50}:	
Avian Reproduction:	
Fish LC_{50}:	
Fish ELS/Life Cycle:	
Other:	

Ecological Incident Reports

Environmental Fate

Water solubility (S_w):	
Soil Mobility (K_{oc}):	
Soil Persistence ($t_{½}$):	
Soil Dissipation (DT_{50}):	

Aquatic Persistence ($t_{½}$):	
Aquatic Dissipation (DT_{50}):	
Potential to Move to Groundwater (GUS score):	
Volatilization (mm Hg):	
Octanol-Water Partition Coefficient (K_{ow}):	
Bioaccumulation/Biocentration: BAF:`	**BCF:**

Worst Case Ecological Risk Assessment

Max Application Rate (ai lbs/acre – ae basis)	**Habitat Management:** **Croplands/Facilities Maintenance:**
EECs	**Terrestrial (Habitat Management):** **Terrestrial (Croplands/Facilities Maintenance):** **Aquatic (Habitat Management):** **Aquatic (Croplands/Facilities Maintenance):**

Habitat Management Treatments

Presumption of Unacceptable Risk		**Risk Quotient (RQ)**	
		Listed (T&E) Species	**Nonlisted Species**
Acute	Birds	[0.1]	[0.5]
	Mammals	[0.1]	[0.5]
	Fish	[0.05]	[0.5]
Chronic	Birds	[1]	[1]

	Mammals	[1]	[1]
	Fish	[1]	[1]

Cropland/Facilities Maintenance Treatments

Presumption of Unacceptable Risk		**Risk Quotient (RQ)**	
		Listed (T&E) Species	**Nonlisted Species**
Acute	Birds	[0.1]	[0.5]
	Mammals	[0.1]	[0.5]
	Fish	[0.05]	[0.5]
Chronic	Birds	[1]	[1]
	Mammals	[1]	[1]
	Fish	[1]	[1]

Justification for Use:	
Specific Best Management Practices (BMPs):	
References:	

Table CP.1 Pesticide Name

Trade Name[a]	Treatment Type[b]	Max Product Rate – Single Application (lbs/acre or gal/acre)	Max Product Rate -Single Application (lbs/acre - AI on acid equiv basis)	Max Number of Applications Per Season	Max Product Rate Per Season (lbs/acre/season or gal/acre/season)	Minimum Time Between Applications (Days)

[a]From each label for a pesticide identified in pesticide use proposals (PUPs), Service personnel would record application information associated with possible/known uses on Service lands.
[b]Treatment type: H – habitat management or CF – cropland/facilities maintenance. If a pesticide is labeled for both types of treatments (uses), then record separate data for H and CF applications.

E.8 Specific Weed Control Plans

The overall goal of the IPM program is as follows: Prevent competition from non-native or invasive plants within newly seeded habitat restoration sites, disturbed soil areas, transportation corridors. Maintain healthy stands of mixes native annual and perennial plants.

1. *Bromus tectorum* (cheatgrass, downy brome)

Priority: Medium: cheatgrass is widely distributed throughout the Protection Island, along roadways, and has invaded remnant native prairie and shrubland communities. Cheatgrass is prolific in dry upland habitat and competes with native plant species in especially disturbed soils such as those found in bluff and grassland habitat, both future restoration sites. It interferes with primary habitat management goals across the landscape, but the infestation is too large to eradicate with available technology.

Description: Cheatgrass is a cool season annual grass that grows from 4 - 30 inches tall, reproducing by seed. Leaf sheaths and flat blades are covered with dense soft hairs. Mature cheatgrass seed heads are slender; 2 - 6 inches long and usually droop to one side. It easily competes with more desirable perennial grasses for moisture because of its fall, winter semi-dormant, and early spring growth habit. Seeds mature in mid to late June and plants dry and cure by the end of June, leading to hazardous fire conditions.

Current Distribution on the Refuge: Cheatgrass is widely distributed throughout Protection Island and unknown on other refuge islands.

Measurable Objective(s): Cheatgrass will be kept to comprising less than 40% of the live vegetation ground cover and spreading beyond its original infestation area.

Strategies:

a. Monitor all newly seeded areas and other disturbed sites (e.g., remediation areas, wildfire areas, road cuts) depleted of native perennial plants.

b. Seed disturbed sites with native species.

c. Control cheatgrass to reduce competition with native plants germinating in the spring.

Control Options:

The chemical treatment of cheatgrass with an appropriate herbicide provides the most effective control. Currently, glyphosate (Roundup™, Roundup Pro™), Clethodim (Select™) and imazapic (Plateau™) are the herbicides used to control cheatgrass on the Refuge. The identified chemical control agents were selected on their versatility and selectivity in prairie restoration areas (Plateau™ and Select™) and complete control in areas requiring devegetation with minimal risk to groundwater contamination (Roundup™). Glyphosate is soil binding, inexpensive, and a low threat to groundwater quality. Imazapic (Plateau™) is used in dry upland sites with low leaching potential. This chemical can be broadcast in restoration areas where the establishment of native grasses and herbicide resistant native broadleafs are essential for restoration success. Clethodim (Select™) is considered as a selective herbicide for use in

grasslands, restoration areas, fence lines and rights of way. Other agents indicated for cheatgrass control but not selected for use are quizalofop, fluazifop-p-butyl,sethoxydim, sulfometuron methyl, and metribuzin. Clethodim is considered less toxic to avian and other wildlife species than other selective grass herbicides (quizalofop, fluazifop-p-butyl, sethoxydim and metribuzin). Clethodim has a short half life in soil and the EPA considers the chemical a low threat to groundwater quality. Other chemicals will be added as needed and be approved at the required level. All chemicals will be used in accordance with label recommendations.

Mechanical control of cheatgrass also is conducted on the Refuge with mixed results. Mowing before seed ripening probably prevents some re-seeding, but oftentimes the plants produce new stems and seeds at the mowed height. Mowing after seed ripening will kill adult plants, but dropped seeds are already viable. Repeated mowing during the growing season may be the most effective mechanical treatment, but is very labor-intensive and only practical on small infestations. Mowing is not possible in areas where cheatgrass starts seeding at height too low for the mower, steep slopes, and inaccessible islands. Prescribed burns in the spring or fall also help to control cheatgrass by stimulating native perennial grass growth or top killing seedlings.

The cultural methods of plowing, discing, etc., often cause an initial flush of cheatgrass growth that is usually controlled with herbicides before seeding with native perennial species. After restoration, the maintenance of healthy native plant communities and the minimization of disturbance help to prevent the spread of cheatgrass back into the area.

Treatment Schedule: Cheatgrass should be sprayed in the fall or early spring when plants are less than 10 cm tall and actively growing and non-target plants are dormant.

2. *Carduus nutans* (musk thistle)

Priority: Medium: musk thistle has a limited distribution throughout the Refuge along roadways, and has invaded remnant native prairie and shrubland communities. Musk thistle is prolific in dry upland habitat and competes with native plant species in disturbed soils such as those found in recently seeded habitat restoration sites. It interferes with primary habitat management goals across the landscape, and the infestation is not too large, therefore this species is targeted for eradicate.

Description: Musk thistle is a biennial which grows up to 6 feet tall. Leaves are dark green, deeply lobed, spiny, and extend onto the stem. Flowers are 1 1/2 to 3 inches in diameter and are usually deep rose, violet, or purple. Musk thistle spreads rapidly to form dense stands that crowd out desirable plants.

Current Distribution on the Refuge: Musk thistle is widely distributed throughout the Refuge at low densities but can be especially prolific in disturbed soils.

Measurable Objective(s): Patches of musk thistle will be kept to less than one acre in area and less than 40% of live vegetation cover.

Strategies:

a. Monitor all newly seeded areas, roadways, and other disturbed sites (e.g., remediation areas, wildfire areas) depleted of native perennial plants.

b. Seed disturbed sites with native species if ground cover is needed.

c. Control musk thistle to reduce competition with native plants germinating in the spring.

Control Options: Mechanical control of musk thistle has been successful in preventing seed production and subsequent spread. Musk thistle is mowed at flowering in habitat restoration sites, along roadways, and in disturbed areas undergoing remediation. Dense stands are often mowed twice when new flowers appear. Repeated mowing during the growing season may be the most effective mechanical treatment, but is very labor-intensive. Small infestations of musk thistle rosettes also are removed by hand digging when labor is available.

The biological control agent, *Rhinocyllus conicus* (seed head weevil) is established in Washington state, but has had limited effect on thistle control and a negative side effect of this biocontrol that it also attacks native thistle species. There are no known native thistle species occurring on any refuge unit. The larvae of this weevil eat the seeds in mature flower heads. This biocontrol is probably effective in reducing musk thistle seed production by up to 50% based on casual observation. Infestations of individual plants or widely dispersed individuals will be examined for the presence of the *Rinocyllus conicus* larvae and adults and left in place if infected. These infected plants can be used as farm plants for the insects with the harvested individuals relocated to larger thistle patches.

The chemical treatment of musk thistle with an appropriate herbicide also provides effective control. Currently, aminopyralid (Milestone), glyphosate (Roundup™, Roundup Pro™), glyphosate (Roundup™, Roundup Pro™, Rodeo™), metsulfuron methyl (Escort™), and imazapic (Plateau™) are the herbicides that could be used to control small musk thistle infestations on the Refuge. Aminopyralid is very selective, provides longer control and can be used at lower rates. Glyphosate is soil binding, inexpensive, with low groundwater contamination potential. Imazapic is used in dry upland sites with low leaching potential. Metsulfuron is extremely effective on thistle and common mullein plants. Imazapic and metsulfuron can be broadcast in restoration areas where native grasses and resistant native broadleafs are essential for restoration success. Other chemicals will be added as needed and be approved at the required level. All chemicals will be used in accordance with label recommendations.

The mechanical methods of plowing, discing, etc., often cause an initial flush of musk thistle rosettes that may be controlled with herbicides before seeding with native perennial species. After restoration, the maintenance of healthy native plant communities and the minimization of disturbance help to prevent the spread of musk thistle back into the area.

Treatment Schedule: Musk thistle should be repeatedly mowed at flowering to prevent seed production and/or sprayed in the rosette stage in fall or late spring during bolting or when desirable non-target plants are dormant. Spraying in the early summer when the plants have bolted or rosettes in the fall are also effective control methods; other options will be used according to the label recommendations.

3. *Centaurea diffusa* (diffuse knapweed)

Priority: High: The spread of diffuse knapweed is an increasing problem in many areas in Washington. It is considered one of the most important rangeland weeds in North America. The State of Washington considers this species one of the top ten priority weeds targeted for control, particularly for preventing new infestations. Diffuse knapweed infests disturbed areas where it forms dense colonies in pastures,

croplands, waste places, and rights-of-way. It is a prolific seed producer, fast spreading, and highly agonistic with native plants, often out competing them.

Description: Diffuse knapweed grows as an annual or short-lived perennial forb. The diffusely branched stems of mature plants are 1 to 2 feet tall, rough to the touch, and tipped with numerous slender, white to purplish flower heads. Prominent yellow bracts with comb-like margin projections subtend the flower. The leaves are pinnately divided near the plant's base; the leaf margins appear entire towards the inflorescence. Flowering occurs from July through September.

Current Distribution on the Refuge: No known infestations are present on any of the refuge islands.

Measurable Objective(s): Treat 100% of new diffuse knapweed plants infestations- targeting for elimination to reduce competition with native plants and prevent establishment of knapweed and knapweed seed bank.

Strategies:

a. Monitor known infestation sites, newly seeded areas, roadways, and other disturbed sites (e.g., remediation areas, wildfire areas) depleted of native perennial plants.

b. Seed disturbed sites with native species.

c. Larger infestation patches will be mapped and measured using geographic information software and a global positioning system device. Patches will be treated to prevent increase in the infestation area.

Control Options: Hand-pulling or digging is a feasible control of small infestations and individual plants. The taproot will be removed to at least 2 inches below the ground surface.

Insect species that target diffuse knapweed include the seedhead weevils (*Larinus minutus*), broad-nosed seedhead weevil *(Bangasternus fausti)* are not well established, and seed head fly (*Urophora affinis*), seed head fly (*Urophora quadrifasciata*), and root boring/gall beetle (*Sphenoptera jugoslavica*) are available for mass collections. These insects reduce seed production which assists in slowing or eliminating spread. Biological agent will be an option in areas that are prohibited to other forms of control and pending the availability of the insect. Biological control of diffuse knapweed on the Refuge has not been attempted in the past.

The chemical treatment of diffuse knapweed with an appropriate herbicide provides relatively effective control. Currently, aminopyralid (Milestone), glyphosate (Roundup™, Roundup Pro™), and imazapic (Plateau™) would be the herbicides used to control diffuse knapweed on the Refuge. Aminopyralid is very selective, provides longer control and can be used at lower rates. Glyphosate is soil binding, inexpensive, and a low threat to groundwater quality. Imazapic (Plateau™) is used in dry upland sites and on soils with low leaching potential. This chemical can be broadcast in restoration areas where the establishment of native grasses and herbicide resistant native broadleafs are essential for restoration success. Other recommended chemical treatments for diffuse knapweed are picloram, clopyralid, dicamba, and 2,4-D. The Refuge avoids the use of restricted use pesticides like picloram. Clopyralid is not recommended for use on permeable soils due to potential groundwater contamination. Dicamba has low toxicity for wildlife but is not recommended for use near water. Aquatic formulations of glyphosate

currently serve for weed control near water. Other chemicals will be added as needed and be approved at the required level. All chemicals will be used in accordance with label recommendations.

Treatment Schedule: Hand removal will be conducted 2 to 3 times during the growing season, the first removal occurring early in the season (June) before bolt. Established areas too large to practically control by hand, or in areas prohibited to chemical control, will be mowed monthly to prevent floret emergence and seed production.

The release of seed head weevils will occur as the leaves of the plants appear in June to the budding stage. Control is less effective if seeds have already formed.

The application of aminopyralid, glyphosate, or imazapic will occur once during the growing season (June - November). The most effective time of control is during the rosette or bolt stage before budding. Annual treatment is necessary as long as there is a viable seed source.

4. *Centaurea maculosa* (spotted knapweed)

Priority: High: The State of Washington considers this species one of the top ten priority weeds targeted for control. Spotted knapweed infests disturbed areas where it forms dense colonies in pastures, croplands, waste places, and rights-of-way. It is a prolific seed producer, fast spreading, and highly agonistic with native plants – often out-competing them. Populations enlarge by peripheral expansion of existing stands. Biodiversity, livestock, and wildlife forage quality are reduced with infestations of spotted knapweed.

Description: Spotted knapweed is a biennial or short-lived perennial forb with a deep taproot. Plants reach 1 to 3 feet with one or more branched stems. The basal leaves vary in morphology from entire to pinnate and elliptical to oblanceolate. The principal stem leaves are pinnately divided. Flowers are primarily light purple (rarely white). Involucral bracts are stiff with a finely branched, dark tip. Flowering occurs from June through September.

Current Distribution on the Refuge: No known infestations are present on any of the refuge islands.

Measurable Objective(s): Treat and control 100% of spotted knapweed plants - targeting for elimination - to reduce competition with native plants and prevent establishment of knapweed and knapweed seed bank.

Strategies:

a. Monitor known infestation sites, newly seeded areas, roadways, and other disturbed sites (e.g., restoration areas, wildfire areas) depleted of native perennial plants.

b. Seed disturbed sites with native species.

c. Larger infestation patches will be mapped and measured using geographic information software and a global positioning system device. Patches will be treated to prevent increase in the infestation area.

Control Options: Hand-pulling or digging is a feasible control of small infestations and individual plants. The taproot will be removed to at least 2 inches below the ground surface. Entire plants will be removed from the site to limit the source of available seeds.

Biological control of spotted knapweed is not effective in eliminating stands. Insect larvae are available that target flowers, roots, shoots, and leaves leading to reduced seed production. Two commonly used organisms that target spotted knapweed roots are the sulphur knapweed moth (*Agapeta zoegana)* and the knapweed weevil (*Cyphocleonus achates*). Biological control could be used in new and current infestations that cannot be controlled by hand or chemical treatment.

The chemical treatment of spotted knapweed with an appropriate herbicide provides relatively effective control. Currently, aminopyralid (Milestone), glyphosate (Roundup™, Roundup Pro™), and imazapic (Plateau™) would be the herbicides used to control spotted knapweed on the Refuge. Aminopyralid is very selective, provides longer control, and can be used at lower rates. Other recommended chemical treatments for diffuse knapweed are picloram, clopyralid, dicamba, and 2,4-D. The Refuge avoids the use of restricted use pesticides like picloram. Clopyralid is not recommended for use on permeable soils due to potential groundwater contamination. Dicamba has low toxicity for wildlife but is not recommended for use near water. Aquatic formulations of glyphosate currently serve for weed control near water. Other chemicals will be added as needed and be approved at the required level. All chemicals will be used in accordance with label recommendations.

Treatment Schedule: Hand removal will be conducted 2 to 3 times during the growing season, the first removal occurring early in the season (June) before bolt. Established areas too large to practically control by hand, or in areas prohibited to chemical control, will be mowed monthly to prevent floret emergence and seed production.

Selected biological control insect(s) will be, if used, released during the optimal time for both insect and plant to provide the greatest effectiveness for controlling spotted knapweed.

Aminoryralid, glyphosate or imazapic will be applied once during the growing season (June - November). The most effective time of control is during the bolt to bud stage. Annual treatment is necessary as long as there is a viable seed source.

5. *Centaurea jacea x nigra* (Meadow Knapweed)

Priority: High: The State of Washington considers this species one of the top ten priority weeds targeted for control. Meadow knapweed invades open, disturbed areas. This species forms monotypic stands, suppressing the growth of other vegetation. Reproduction is primarily from seeds and crown.

Description: Meadow knapweed is a perennial, growing from a woody root crown, with 20 to 40 inch tall upright stems. Its basal leaves can be up to six inches long and 1.25 inches wide, tapering at both ends. The stem leaves are lance-shaped, stalkless, and sometimes shallowly lobed, while the uppermost leaves are smaller and not lobed. The rose-purple to occasionally white flowers occur in solitary, oval, or almost globe-shaped flower heads at the ends of branches. The light to dark brown involucral bracts are roundish, with a torn, thin, papery margin, or a comb-like, fringed margin. More apparent on outer bracts, the fringes are about equal in width to the central body of the bract. Meadow knapweed flowers from

July to September, producing ivory-white to light brown seeds that may or may not have a barely noticeable plume. However, because it is a hybrid, meadow knapweed traits are highly variable.

Current Distribution on the Refuge: No known infestations are present on any of the refuge islands.

Measurable Objective(s) : Treat and control 100% of Meadow knapweed plants - targeting for elimination - to reduce competition with native plants and prevent establishment of knapweed and knapweed seed bank. Prevent competition with newly seeded native plants in habitat restoration sites, along roadways, and other disturbed soil areas.

Strategies:

a. Monitor known infestation sites, newly seeded areas, roadways, and other disturbed sites (e.g., remediation areas, wildfire areas) depleted of native perennial plants.

b. Seed disturbed sites with native species.

c. Larger infestation patches will be mapped and measured using geographic information software and a global positioning system device. Patches will be treated to prevent increase in the infestation area.

Control Options:

Removal of the above-ground tissue by mowing or hand-scything weakens the plant, reduces root growth, and prevents seed production, but will not eliminate the infestation.

Biological control with the seed head gall fly, *Urophora quadrifasciata*, has had fair success on meadow knapweed.

The reseeding of disturbed areas is effective in preventing the infestation of Russian knapweed

The chemical treatment of Meadow knapweed with an appropriate herbicide provides relatively effective control. Currently, aminopyralid (Milestone), glyphosate (Roundup™, Roundup Pro™), and imazapic (Plateau™) would be the herbicides used to control Meadow knapweed on the Refuge. Aminopyralid is very selective, provides longer control and can be used at lower rates. Glyphosate is soil binding, inexpensive, with low groundwater contamination potential. Glyphosate is a nonspecific herbicide and the use of it should be accompanied by seeding, planting, or use in areas where native vegetation is prolific. Imazapic (Plateau™) is used in dry upland sites and on soils with low leaching potential. This chemical can be broadcast in restoration areas where the establishment of native grasses and herbicide-resistant native broadleafs are essential for restoration success. Other chemicals will be added as needed and be approved at the required level. All chemicals will be used in accordance with label recommendations.

Treatment Schedule: Top growth will be removed before bolting during the growing season (June - mid-August) to weaken Russian knapweed plants. Plants that re-emerge (mid-August to September) are smaller and more vulnerable to further top removal and herbicide effect.

Glyphosate will be applied once or twice during the growing season (June - November). Top-growth of Russian knapweed can be controlled by applying herbicide during the bud stage. Root control is achieved by timing applications to the late bud and fall growth stage. Other listed chemical will be used according to the label recommendations.

6. *Polygonum bohemicum* (Bohemian knotweed)

Priority: High: The State of Washington considers this species one of the top ten priority weeds targeted for control. The most common invasive knotweeds in western Washington, this species is a hybrid between giant and Japanese knotweed and shares characters of both parent species. It was introduced as an ornamental in its own right but has become very widespread in our region, especially along rivers and roadways. This plant spreads mostly by stem and root fragments and is usually found in disturbed areas such as flood zones and roadsides.

Currently, most Bohemian knotweed plants are males and therefore lack seeds. Recent findings have found that seed-bearing hybrids have appeared, probably indicating a back-cross with giant or Japanese knotweed. The existence of seeding hybrids may allow this plant to spread even more rapidly in the future.

Description: Plants are usually 6.5 to 10 feet tall. Stems are stout, cane-like, hollow between the nodes, somewhat reddish-brown and usually branched. The plants die back above ground at the end of the growing season. However, the dead reddish brown canes often persist throughout the winter. The stem nodes are swollen and surrounded by thin papery sheaths. Leaves can be either spade or heart-shaped, usually more heart-shaped lower down on the stems and more spade-shaped near the branch ends. This variability in leaf shape is one identifying character since the parent species generally have either heart-shaped or spade-shaped leaves.

One key identifying feature is the hairs on the leaf undersides, especially along the midvein. Bohemian knotweed has hairs that are short and broad-based (triangular-shaped), compared with long and wavy in giant knotweed and reduced to barely noticeable bumps in Japanese knotweed.

The flowers are small, creamy white to greenish white, and grow in showy, plume-like, branched clusters from leaf axils near the ends of the stems. Flower clusters are generally about the same length as the subtending leaf, unlike the shorter flower clusters found on giant knotweed and the longer clusters found on Japanese knotweed. Leaf and flower characters are most reliable when looking near the middle of a branch. The fruit is 3-sided, black and shiny

Current Distribution on the Refuge: Only known infestations are on the Dawley unit.

Measurable Objective(s): Treat and control 100% of Bohemian knotweed plants - targeting for elimination - to reduce competition with native plants and prevent establishment of knotweed and knotweed seedbank.

Strategies:

a. Monitor known infestation sites, newly seeded areas, roadways, and other disturbed sites (e.g., remediation areas, wildfire areas) depleted of native perennial plants.

b. Seed disturbed sites with native species.

c. Larger infestation patches will be mapped and measured using geographic information software and a global positioning system device. Patches will be treated to prevent increase in the infestation area.

Control Options:

Knotweed is very difficult to eradicate once it has become established. It is, therefore, important to prevent new infestations and eradicate small patches before they spread. Mechanical and chemical control methods can be used on knotweed, often in conjunction with each other. If control is to be effective, the sites must be visited throughout several seasons to further control any new growth.

Removal of the above-ground tissue by mowing or hand-scything weakens the plant, but because of the extensive root system this method is ineffective as a control method especially on larger infestation.

The reseeding of disturbed areas is effective in preventing the infestation of Bohemian knotweed.

The chemical treatment of Bohemian knotweed by injection with an appropriate herbicide provides relatively effective control. Currently, imazaypr (Arsenal) and glyphosate (Roundup™, Roundup Pro™) would be the herbicides used to control Bohemian knotweed on the Refuge. Imazaypr is similar to glyphosate, has a very low toxicity to most animals, but does remain in the soil longer than glyphosate. Mixing two kinds of herbicides together often improves the effectiveness when compared with using each herbicide individually. By mixing the glyphosate and imazapyr together, we can reduce the total amount of herbicide used. Glyphosate is soil binding, inexpensive, with low groundwater contamination potential. Glyphosate is a nonspecific herbicide and the use of it should be accompanied by seeding, planting, or use in areas where native vegetation is lacking. Other chemicals will be added as needed and be approved at the required level. All chemicals will be used in accordance with label recommendations.

Treatment Schedule: Injection of the herbicide is best done at the end of summer (August, September) just prior to seed set.

7. *Cirsium arvense* (Canada thistle)

Priority: Low to Medium: The priority for controlling this species is dependent upon location. The State of Washington considers this species widespread and detrimental to agriculture. Canada thistle can form monocultures, crowding out desirable species. Extensive horizontal roots give rise to shoots. This species infests roadsides, pastures, cropland, disturbed areas, and riparian areas. The dense growth pattern and spiny leaves of Canada thistle deter passage and consumption by wildlife.

Description: Canada thistle is a colony-forming perennial forb. Stems reach 1 to 4 feet with branching tops. Flowers are purple with spineless bracts. The leaves are irregularly lobed and tipped with tiny spines. Flowering occurs July through August.

Current Distribution on the Refuge: Canada thistle is widely distributed on Protection Island, found in various soil types and vegetation communities. This species tends to invade re-seeded restoration areas.

Measurable Objective(s): Canada thistle control applied to keep infestations to less than 1 acre in area and weedy species comprising 40% or less of live vegetation cover.

Strategies:

a. Monitor known infestation sites, newly seeded areas, roadways, and other disturbed sites (e.g., remediation areas, wildfire areas) depleted of native perennial plants.

b. Seed disturbed sites with native species.

Control Options: The nature of the Canada thistle infestation on Protection Island makes it impossible to control with simple hand methods. The removal of shoots by mowing is a viable option. The continued removal of above ground photosynthetic tissue has been shown to weaken plants and limit their spread through carbohydrate starvation.

Biological control offers many insects, a few nematodes, and the American Goldfinch, which has been reported to feed on various parts of Canada thistle. Most of these do very little damage. Three insects from Europe have been studied for biological control - *Altica carduorum* Guer (flea beetle), a leaf feeder, has not established itself well. Adults of the beetle *Ceutorhynchus litura* F. eat young thistle shoots, but do little damage. The fly, *Urophora cardui* L. is the most promising biological control agent. Eggs are laid in the terminal buds and galls develop which divert nutrients and stress the plant. Many microorganisms have been found associated with Canada thistle, but no potential biocontrol agents are known.

The chemical treatment of Canada thistle with an appropriate herbicide provides relatively effective control. Currently, aminopyralid (Milestone), glyphosate (Roundup™, Roundup Pro™, Rodeo®, and imazapic (Plateau ®) are the herbicides used to control Canada thistle on the Refuge. Aminopyralid is very selective, provides longer control, can be used at lower rates, and be applied near water. Glyphosate is soil binding, inexpensive, with low groundwater contamination potential. Glyphosate is a nonspecific herbicide and the use of it should be accompanied by seeding, planting, or use in areas where native vegetation is prolific. Imazapic (Plateau™) is used in dry upland sites and on soils with low leaching potential. This chemical can be broadcast in restoration areas where the establishment of native grasses and herbicide resistant native broadleafs are essential for restoration success. Other herbicides that are shown to be effective on Canada thistle are picloram, clopyralid, and 2,4-D. The Refuge avoids the use of restricted-use pesticides like picloram. Clopyralid is not recommended for use on leachable soils. 2,4-D will be used on the Refuge with its effectiveness monitored and the use expanded to possibly replace imazapic in some capacities. As with all herbicides, 2,4-D has been detected in groundwater although the sources of contamination are associated with inappropriate use and spillage. Other chemicals will be added as needed and be approved at the required level. All chemicals will be used in accordance with label recommendations.

Treatment Schedule: Hand-pulling or digging of plants in the rosette stage is effective for small infestations. Monthly mowing or scything of bolted plants in moist soil areas or areas with a high water table (riparian/wetlands) are effective in limiting spread.

The stem-and-shoot gadfly will be released in June through July for new and existing invaded wetland areas where chemical and mechanical controls are not feasible.

Chemical control will occur in spring and fall, 1-2 times per season (June-October), particularly in the fall when shoot-to-root translocation is highest. This species is sensitive to moisture content or drought stress. Application of pesticide should occur when moisture condition is higher.

8 *Cirsium vulgare* (bull thistle)

Priority: Low to Medium: The priority for controlling this species is dependent upon location. Bull thistle grows in moist to dry areas, particularly in loamy or clay soils. It is a rapidly proliferating transient species in disturbed, open sites. Native vegetation and wildlife habitat value are compromised by infestation.

Description: Bull thistle is a biennial forb with a rosette forming the first year. A short tap root supports a 2-to-5-foot many-branched stem during the second year. The leaves are pinnatley lobed, prickly, with a cottony underside. The involucre of the light purple flower is covered with long spines. Flowering occurs from July through September.

Current Distribution on the Refuge: Bull thistle has not produced major infestations on the Refuge.

Measurable Objective(s): Control bull thistle to keep infestations to less than 1 acre and less than 40% of live vegetation cover.

Strategies:

a. Monitor known infestation sites, newly seeded areas, roadways, and other disturbed sites (e.g., remediation areas, wildfire areas) depleted of native perennial plants.

b. Seed disturbed sites with native species.

c. Control bull thistle to reduce competition with native plants by preventing seed production.

Control Options: Small stands of bull thistle will be mowed, scythed, or hand cut to remove the bolted but not flowered stem. Hand-cutting will include removing the stem and root crown.

The bull thistle seed head gall fly (*Urophora stylata*) is effective in reducing stand density. Control of seed production is effective where the population of gall flies is high. This control method is not recommended for small infestations.

The chemical treatment of bull thistle with an appropriate herbicide provides relatively effective control. Currently, aminopyralid (Milestone), glyphosate (Roundup™, Roundup Pro™, Rodeo™), and imazapic (Plateau™) are the herbicides used to control bull thistle on the Refuge. Aminopyralid is very selective, provides longer control, can be used at lower rates. Glyphosate is soil binding, inexpensive, and a low threat to groundwater quality. Imazapic (Plateau™) is used in dry upland sites and on soils with low leaching potential. This chemical can be broadcast in restoration areas where the establishment of native grasses and herbicide-resistant native broadleafs are essential for restoration success. Other chemicals will be added as needed and be approved at the required level. All chemicals will be used in accordance with label recommendations.

Treatment Schedule: Mechanical and hand removal will occur during bolt but before flowering (late June - July). Late bolting plants need removal before flowering to prevent seed formation.

Herbicides will be applied 1 -2 times during the growing season (April - November). Application will occur during the rosette stage or after mowing or scything.

9. *Convolvulus arvensis* (field bindweed)

Priority: Low to Medium: Field bindweed is a highly competitive species with prodigious powers of regeneration from roots and rhizomes. Bindweed can survive a wide range of environmental conditions, but disturbed soil is a necessity for invasion. Bindweed is a threat to the regeneration of native vegetation.

Description: Field bindweed is perennial forb growing as a climbing and prostrate vine that forms dense mats. The taproot is deep, forming an extensive root system. The leaves are sagittate; flowers are bell-shaped and pink to white. Blooming occurs from June until frost.

Current Distribution on the Refuge: Bindweed is widely spread on Protection Island and unknown on other islands.

Measurable Objective(s): Keeping any infestation at less than 40% of live vegetation cover.

Strategies:

a. Monitor known infestation sites, newly seeded areas, roadways, and other disturbed sites (e.g., remediation areas, wildfire areas) depleted of native perennial plants.

b. Seed disturbed sites with native species.

c. Control field bindweed to reduce competition with native plants.

Control Options: Mechanical and hand methods of control are impractical and ineffective due to the species' distribution and ability to regenerate from severed roots and rhizomes.

The chemical treatment of field bindweed with an appropriate herbicide provides relatively effective control. Currently, glyphosate (Roundup™, Roundup Pro™) and imazapic (Plateau™) are the herbicides used to control field bindweed on the Refuge. Glyphosate is soil binding, inexpensive, and a low threat to groundwater quality. Imazapic (Plateau™) is used in dry upland sites and on soils with low leaching potential. This chemical can be broadcast in restoration areas where the establishment of native grasses and herbicide-resistant native broadleafs are essential for restoration success. Other herbicides indicated for field bindweed control are picloram, dicamba, and 2,4-D. The uses of restricted-use pesticides like picloram are avoided at the Refuge. Dicamba has low wildlife toxicity but is not for use near water. Aquatic formulations of glyphosate fill that niche. 2,4-D will be used at the Refuge. Its effectiveness will be monitored and the herbicide will be considered as a replacement for imazapic in some situations. As with all herbicides, 2,4-D has been detected in groundwater, although the sources of contamination are associated with inappropriate use and spillage. Other chemicals will be added as needed and be approved at the required level. All chemicals will be used in accordance with label recommendations.

The field bindweed moth (*Tyta luctuosa*) and the field bindweed mite (*Aceria malherbae*) have not been used to control field bindweed at the Refuge. These agents have not established well in the Pacific Northwest.

Treatment Schedule: Herbicides will be applied 1 - 2 times during the growing season (June - November). The period of highest chemical effectiveness is in the early flowering stage. Invaded sites will be monitored to determine the local variation in conditions that lead to the plants' flowering time. Multiple-year applications may be necessary.

The field bindweed moth and field bindweed mite would be released to heavily infested bindweed sites during the early growing season (June through August). The release of bioagents will be dependent on the insects' availability.

10 *Hypericum perforatum* (St. Johnswort)

Priority: Low to medium: St. Johnswort invades disturbed sites along roadsides, over-grazed pastures and range, and waste places. It prefers dry, sandy to gravelly soil. St. Johnswort forms a deep, laterally spreading root system that forms new plants vegetatively from root buds. Dense growth of these plants inhibits regeneration of native species.

Description: St. Johnswort is a perennial shrub-like forb. The stems produce numerous branches and reach 1 to 3 feet high. Leaves are up to one inch long, opposite, entire, and contain numerous transparent dots. Flowers are yellow, arranged in open, flat-topped cymes.

Current Distribution on the Refuge: St. Johnswort has not been identified on any of the Refuge lands.

Measurable Objective(s): Treat 100% of St. Johnswort plants - targeting for elimination - to reduce competition with native plants and stop the spread of infestations.

Strategies:

a. Monitor known infestation sites, newly seeded areas, roadways, and other disturbed sites (e.g., remediation areas, wildfire areas) depleted of native perennial plants.

b. Seed disturbed sites with native species.

Control Options: Small infestations of new plants can be pulled by hand or dug out. Glyphosate (Roundup® and Roundup Pro®) is effective in controlling St. Johnswort. Glyphosate is soil binding, inexpensive, and a low threat to groundwater quality. Other herbicides indicated for effective St. Johnswort control are picloram and 2,4-D. The use of restricted-use pesticides such as picloram is avoided on the Refuge. 2,4-D is planned for use on the Refuge to control various broadleaf noxious weeds and its use for St Johnswort control could be considered in the future. As with all herbicides, 2,4-D has been detected in groundwater although the sources of contamination are associated with inappropriate use and spillage. Other chemicals will be added as needed and be approved at the required level. All chemicals will be used in accordance with label recommendations.

Biological control of St. Johnswort with the Klamath weed beetle (*Chrysolina quadrigemia*) has been very effective in North America. Two foliage beetles, *Chrysolina hyperici* and *C. quadrigemina,* were

released in California from 1945 to 1946, and established within two years. A root-boring beetle, *Agrilus hyperici,* and a leaf bud gall-forming midge, *Zeuxidiplosis giardi,* were released in 1950 to help the *Chrysolina* spp. Recently released in the state and established is the moth *Aplocera plagiata.* Due to the success of these beetles in controlling St. Johnswort, their continued use for established and new infestations is the preferred method of control.

Treatment Schedule: Removal and disposal of plants will be done in early spring (before flower formation).

Spot spraying with glyphosate (Roundup® and Roundup Pro®) before flowering can be an effective control method if repeated applications are made. Bolting and flowering occur early and continue through late summer (June - September). Patches need to be monitored for newly sprouted plants throughout the summer.

The release of Klamath weed beetles will be made in July to new or non-beetle infested areas. Beetles (if available) established in an area on the Refuge will be harvested and used as colonizers.

11. *Linaria genistifolia* (dalmatian toadflax)

Priority: High: Dalmation toadflax is an aggressive, colony-forming invasive. This species is opportunistic in invading disturbed sites, but it can also press into established vegetation communities in good condition. Native communities and restored sites may be jeopardized by the creeping expansion of Dalmation toadflax adventitious root buds. Competition between natives and toadflax may make the community more vulnerable to other invasive species. Dalmation toadflax produces a toxic substance and is unpalatable to livestock and wildlife.

Description: Dalmation toadflax is a perennial forb reaching up to 3 feet in height. Reproduction is by seed and underground root stalks. Leaves are alternate and variable in shape - ovate to lanceolate. Leaves and stems are robust, glaborous with whitish or bluish cast. Flowers grow at the axils of the upper leaves. The spurred-flower is yellow with an orange center. Flowers bloom late June through October.

Current Distribution on the Refuge: Currently, no islands are known to have any infestation, but Dungeness Spit has a small patch located on Graveyard spit. That site has been treated for several years by hand-pulling.

Measurable Objective(s): Treat 100% of Dalmation toadflax plants - targeting for elimination - to reduce competition with native plants.

Strategies:

a. Monitor known infestation sites, newly seeded areas, roadways, and other disturbed sites (e.g., remediation areas, wildfire areas) depleted of native perennial plants.

b. Seed disturbed sites with native species.

Control Options: Hand-pulling individual plants before seed set decreases seed production. Scything or mowing of stands before seed set is also effective. These methods do not kill the plant, but over time with repeated pulling, the population will be reduced.

The chemical treatment of Dalmation toadflax with an appropriate herbicide provides relatively effective control. Currently, glyphosate (Roundup™, Roundup Pro™) and imazapic (Plateau™) are the herbicides used to control Dalmation toadflax on the Refuge. Glyphosate is soil binding, inexpensive, and a low threat to groundwater quality. Glyphosate is appropriate for spot treatments, but its broad specificity precludes broadcast applications. Imazapic (Plateau™) is used in dry upland sites and on soils with low leaching potential. This chemical can be broadcast in restoration areas where the establishment of native grasses and herbicide-resistant native broadleafs are essential for restoration success. Other chemicals will be added as needed and be approved at the required level. All chemicals will be used in accordance with label recommendations.

Biological control using *Calophasia lunula*, a defoliating moth, is well-established in Washington and reportedly provides good control.

Treatment Schedule: The removal of above ground portions of the plant before seed set will be done in April through July. The seeds are long-lived; annual removal of plants for up to ten years is necessary to deplete the seed bank.

Applications of glyphosate and imazapic will be made one to two times per growing season (April - November). Fall applications are particularly effective in decreasing the available stored carbohydrates in the roots.

12. *Linaria vulgaris* (yellow toadflax)

Priority: High: Yellow toadflax is an aggressive, colony-forming invasive. This species is opportunistic in invading disturbed sites, but it can also press into established vegetation communities in good condition. Native communities and restored sites may be jeopardized by the creeping expansion of yellow toadflax adventitious root buds. Competition between natives and toadflax may make the community more vulnerable to other invasive species. Yellow toadflax produces a toxic substance and is unpalatable to livestock and wildlife.

Description: Yellow toadflax is a perennial forb, 1 to 2 feet, with pale green, alternate, linear leaves. The base of the branched stem is woody. Stems and leaves are pale green. Flowers are spurred and yellow with an orange center.

Current Distribution on the Refuge: No known infestations exist on Refuge lands.

Measurable Objective(s): Treat 100% of yellow toadflax plants - targeting for elimination - to reduce competition with native plants.

Strategies:

a. Monitor known infestation sites, newly seeded areas, roadways, and other disturbed sites (e.g., remediation areas, wildfire areas) depleted of native perennial plants.

b. Seed disturbed sites with native species.

Control Options: Hand-pulling individual plants before seed set decreases seed production. Scything or mowing of stands before seed set is also effective. These methods do not kill the plant.

The chemical treatment of yellow toadflax with an appropriate herbicide provides relatively effective control. Currently, glyphosate (Roundup™, Roundup Pro™) and imazapic (Plateau™) are the herbicides used to control yellow toadflax on the Refuge. Glyphosate is soil binding, inexpensive, and a low threat to groundwater quality. Glyphosate is appropriate for spot treatments, but its broad specificity precludes broadcast applications. Imazapic (Plateau™) is used in dry upland sites and on soils with low leaching potential. This chemical can be broadcast in restoration areas where the establishment of native grasses and herbicide resistant native broadleafs are essential for restoration success. Other chemicals will be added as needed and be approved at the required level. All chemicals will be used in accordance with label recommendations.

Treatment Schedule: The removal of above ground portions of the plant before seed set will be done in April through July. The seeds are long-lived; annual removal of plants for up to ten years is necessary to deplete the seed bank.

Applications of glyphosate and imazapic will be made one to two times per growing season (April - November). Fall applications are particularly effective in decreasing the available stored carbohydrates in the roots.

13 *Onopordum ancanthium* (Scotch thistle)

Priority: Low to Medium: Scotch thistle aggressively invades disturbed and moist areas. This thistle, due to its size and spinous leaves, presents a passage barrier. Infestation decreases the value and area of wildlife habitat. Scotch thistle seeds have a water-soluable germination inhibitor that facilitates its own propagation and expansion along irrigation canals and other wet areas. Scotch thistle reproduces by seed.

Description: Scotch thistle is biennial forb that grows to 12 feet high. Leaves are large, green, and spiny. Fine hairs give the leaves a cottony appearance. First-year rosettes are 10 to 12 inches in diameter. Leaves of the mature plant may be two feet in length with a prominent white mid-rib. Flower heads are numerous and terminal. Flowers are 1 to 2 inches in diameter, pale purple to red in color.

Current Distribution on the Refuge: No known infestations exist on Refuge lands.

Measurable Objective(s): Keep infestations to less than 1 acre and less than 40% of live vegetation cover.

Strategies:

a. Monitor known infestation sites, riparian and moist areas, newly seeded areas, roadways, and other disturbed sites (e.g., remediation areas, wildfire areas) depleted of native perennial plants.

b. Seed disturbed sites with native species.

c. Control Scotch thistle to reduce competition with native plants.

Control Options: Mechanical treatment will include hand-pulling or cutting of individual plants and small stands. The taproot will be cut 1-2 inches below the ground surface. Scything and mowing will be options for larger stands. The removal of the top material before flower production decreases the number of seeds available for spreading and propagation. Preventing flowering by mechanical means in

conjunction with herbicide application for root killing is most effective in eliminating and controlling Scotch thistle.

The chemical treatment of Scotch thistle with an appropriate herbicide provides relatively effective control. Currently, aminopyralid (Milestone), glyphosate (Roundup™, Roundup Pro™), imazapic (Plateau™), and metsulfron methyl (Escort®) are the herbicides used to control Scotch thistle on the Refuge. Aminopyralid is very selective, provides longer control and can be used at lower rates. Glyphosate is soil binding, inexpensive, and a low threat to groundwater quality. Glyphosate is appropriate for spot treatments, but its broad specificity precludes broadcast applications. Imazapic (Plateau™) is used in dry upland sites and on soils with low leaching potential. This chemical can be broadcast in restoration areas where the establishment of native grasses and herbicide-resistant native broadleafs are essential for restoration success. Metsulfuron methyl is very effective for thistle and mullein control and is the preferred treatment in restoration areas with a high infestation level. Other chemicals will be added as needed and be approved at the required level. All chemicals will be used in accordance with label recommendations.

Treatment Schedule: Mechanical treatment will target plants before flowering (April to mid-June). Herbicides will be applied before bolting in the spring (April to June), possibly in conjunction with mechanical control, or to rosettes in fall (September -November).

14. *Spartina anglica* (cordgrass, Common)

Priority: High: The State of Washington considers this species one of the top ten priority weeds targeted for control, particularly for preventing new infestations. Cordgrass is an aggressive species that regenerates from large rootstocks. Excessive proliferation of cordgrass can lower the groundwater level, reduce the amount of surface water, reduce habitat for wildlife dependent on open water, reduce bird use by as much as 50%, reduce and interfere with water flow through drainages.

Description: Cordgrass is a perennial grass with stems reaching 7 feet. The stems have a waxy coating. Leaves are flat, 1/4 to 3/4 inch wide. The leaves lack auricles and have ligules that consist of a fringe of hairs. The leaf blades, which may be flat or inrolled, are 5 to 12 mm broad and may be persistent or falling. The flowers occur in numerous, erect, contracted panicles, which consist of closely overlapping spikelets in two rows on one side of the rachis. Reproduction is by seed, rhizomes, tillering, and rhizome fragments. The panicle is 3 to 8 inches long, initially compact but opening upon maturity.

Current Distribution on the Refuge: Common cordgrass' only known infestation is on Graveyard spit on Dungeness NWR.

Measurable Objective(s): Treatment applied to keep infestation to less than 40% of live vegetation cover and prevent infestations from increasing in area.

Strategies:

a. Monitor known infestation sites - riparian, wetland, and moist areas for significant adverse effects on water flow and wildlife habitat.

b. Seed disturbed sites with native species.

c. Control common cordgrass to reduce competition with native plants and significantly altering the environment.

Control Options: Mowing infestations can contain growth, limit seed set, and eventually kill the plants. To be effective, clones must be mowed repeatedly, beginning with initial spring green-up and continued until fall die-back. For clones under 10 feet in diameter, one to three mowings during the growing season may be effective. Larger clones need to be mowed nine to ten times over two seasons for eradication. In some cases, mowing will be required for a third or fourth year (Spartina Task Force 1994).

Chemical control with glyphosate (Rodeo®) would be used on the Refuge for effective control of common cordgrass. Glyphosate is soil binding, inexpensive, a low threat to groundwater quality, and used to target numerous weed species. This chemical formulation is approved for aquatic application. All chemicals will be used in accordance with label recommendations.

Treatment Schedule: Data from herbicide trials in Willapa Bay suggest chemical control is best performed when the plants carbohydrate stores are lowest. Treatment will be conducted 1 to 2 times per season - once in the summer (June - August) and/or once in the spring (May) (Norman and Patten 1995).

15. *Rubus armeniacus* (Himalayan blackberry) and *Rubus laciniatus* (Evergreen blackberry)

Priority: High: Although widespread in Washington and control in not required, these species are highly invasive and difficult to control. Therefore it is important to protect wilderness areas as well as areas being restored to native vegetation.

Description: A robust, thicket forming shrub with stout arching canes with large stiff thorns. They can grow up to 15 feet tall; canes to 40 feet long. They bloom in the spring and the flowers are small, white to pinkish with five petals and Himalayan blackberry leaves are palmately compound with large, rounded to oblong, toothed leaflets usually in groups of 5 on main stems, while Evergreen blackberry (also known as cut-leaf blackberry) has deeply incised leaflets. They can be distinguished from the native trailing blackberry (*Rubus ursinus*) by its tall, arching reddish-brown canes, much more robust plants, rounder leaflets (or deeply incised leaflets for evergreen blackberry), and larger fruits and flowers

Current Distribution on the Refuge: Only known infestations exist on the Dawley Unit.

Measurable Objective(s): Treat 100% of new blackberry plant infestations - targeting for elimination - to reduce competition with native plants. Reduce existing stands of blackberry live cover by 25% annually.

Strategies:

a. Monitor known infestation sites, newly seeded areas, roadways, and other disturbed sites (e.g., remediation areas, wildfire areas) depleted of native perennial plants.

b. Seed disturbed sites with native species.

Control Options: Mechanical control includes hand-pulling of small infestations, mowing or herbicide of larger patches.

The chemical treatment of blackberries with an appropriate herbicide provides relatively effective control. Currently, glyphosate (Roundup™, Roundup Pro™), would be used on the Refuge. Glyphosate is soil binding, inexpensive, and a low threat to groundwater quality. Glyphosate is appropriate for spot treatments. Metsulfuron methyl is very effective for thistle, mullein control and blackberry is the preferred treatment in restoration areas with a high infestation level. This chemical can be broadcast in restoration areas where the establishment of native grasses and herbicide-resistant native broadleafs are essential for restoration success. Other chemicals will be added as needed and be approved at the required level. All chemicals will be used in accordance with label recommendations.

Cultural control of blackberries is an important control method. The key to controlling spread is by decreasing seed production in established patches, and/or preventing the cane tips or nodes from touching the ground to produce "daughter' plants. Methods that assist in these control strategies are minimizing soil disturbance, maintaining healthy native vegetation, and control of seed formation with a combination of mechanical and chemical techniques.

Treatment Schedule: The pulling can be done anytime. Mowing or cutting midsummer allows plant to grow back 18 inches then treat with herbicide is the preferred method.

Chemical application will occur during the Fall (Sept, Oct.).

16. *Hedera helix* (English Ivy)

Priority: Low: Although widespread in western Washington and control in not required, this specie is highly invasive but fortunately not too difficult to control. Therefore it is important to protect wilderness areas as well as areas being restored to native vegetation.

Description: Evergreen vine that can trail along the ground or grow veritcally up trees, fences, walls and hillsides. Most common type of growth lacks flowers and has dull green, lobed leaves with light veins that grow alternately along trailing or climbing stems. Leaf shape and size varies between varieties from deeply to shallowly lobed and from small, narrow leaves to large, broadly shaped leaves. Mature form of growth has shiny, unlobed leaves that grow in dense, whorl-like clusters and produce umbrella-like groups of small yellow-green flowers in the fall, followed by dark purple-black berries in the late winter or early spring.

Current Distribution on the Refuge: Only known infestations exist on Dawley Unit and Matia Island.

Measurable Objective(s): Treat 100% of ivy plants - targeting for elimination - to reduce competition with native plants.

Strategies:

a. Monitor known infestation sites, newly seeded areas, roadways, and other disturbed sites (e.g., remediation areas, wildfire areas) depleted of native perennial plants.

b. Seed disturbed sites with native species.

Control Options: Mechanical control includes hand-pulling and cutting of vines or herbicide for larger patches.

The chemical treatment of ivy with an appropriate herbicide provides relatively effective control. Currently, glyphosate (Roundup™, Roundup Pro™), would be used on the Refuge. Glyphosate is soil binding, inexpensive, and a low threat to groundwater quality. Glyphosate is appropriate for spot treatments. Other chemicals will be added as needed and be approved at the required level. All chemicals will be used in accordance with label recommendations.

Cultural control of ivy is an important control method. The key to controlling spread is by decreasing seed production in established patches, and/or preventing the vegetative spreading of the plants. Methods that assist in these control strategies are minimizing soil disturbance, maintaining healthy native vegetation, control seed formation with a combination of mechanical and chemical techniques.

Treatment Schedule: The pulling can be done anytime. Mowing or cutting midsummer allows plant to grow back 18 inches then treat with herbicide is the preferred method. Cutting vines and treating stems with herbicide or foliar in spring are good alternatives.

Chemical application will occur during the Spring or Fall.

17. *Cytisus scoparius* (Scotch Broom)

Priority: High: The State of Washington considers this species as a Class B Noxious weed, and control is recommended. Scotch broom infests disturbed areas, along roadsides, pastures, and open areas where it forms dense colonies. It reproduces by seeds, which can remain viable for up to 60 years. Populations enlarge by peripheral expansion of existing stands, forming monocultures. Biodiversity, and livestock and wildlife forage quality are reduced with infestations of scotch broom. Seeds are toxic to livestock and horses.

Description: Scotch broom is a perennial evergreen shrub with a deep taproot. Plants reach 3 to 10 feet tall with many branched stems. There are relatively few leaves that are simple in the upper part of the plant and the lower parts are 3 leaflets and deciduous. Flowers are primarily yellow, but may be tinged with red or purple. They are an irregular shaped pea-like flower about ¾ of an inch long. Flowering occurs from April to June.

Current Distribution on the Refuge: Only known infestation is at the Dawley unit of the refuge complex.

Measurable Objective(s): Treat and control 100% of scotch broom plants - targeting for elimination - to reduce competition with native plants and prevent establishment of Scotch broom or its seed bank.

Strategies:

a. Monitor known infestation sites, newly seeded areas, roadways, and other disturbed sites (e.g., restoration areas, wildfire areas) depleted of native perennial plants.

b. Seed disturbed sites with native species.

c. Larger infestation patches will be mapped and measured using geographic information software and a global positioning system device. Patches will be treated to prevent increase in the infestation area.

Control Options: Hand-pulling or digging using a weed wrench is a feasible control of small infestations and individual plants. The taproot will be removed to at least 2 inches below the ground surface. Entire plants will be removed from the site to limit the source of available seeds or removed prior to seed set.

Biological control of scotch broom is limited with a few domestic animals browsing the young stems. Two introduced insects, the twig-mining moth (*Leucoptera spartifoliella*) and the seed weevil (*Apion fuscirostre*), eat only Scotch broom. They have been released in western Clallam County but their effectiveness in controlling Scotch broom has not yet been established.

The chemical treatment of scotch broom with an appropriate herbicide provides relatively effective control. Currently, triclopyr (Garlon ™), or glyphosate (Roundup™, Roundup Pro™) would be the herbicides used to control Scotch broom on the Refuge.

Treatment Schedule: Hand removal will be conducted 2 to 3 times during the growing season, the first removal occurring early in the season (March) well before flowering. Established areas too large to practically control by hand, or in areas where injury to surrounding vegetation prohibits broad scale application with chemical control, a cut and stump treatment will be used.

Selected biological control insect(s) will be, if used, released during the optimal time for both insect and plant to provide the greatest effectiveness for controlling Scotch broom.

Triclopyr or glyphosate will be applied once before the flowering season (April-June). Annual treatment is necessary as long as there is a viable seed source.

Other Weed species of Concern

Newly discovered weeds on Dungeness, Dawley, Protection Island, or San Juan Island Units include:

- Oxeye Daisy (*Leucanthemum vulgare)*
- Spurge Laurel (*Daphne laureola)*
- English Holly (*Ilex aquifolium)*

These are species currently not known to occur on the Refuge but are known to occur in surrounding areas. These include:

- Purple Loosestrife (*Lythrum salicaria)*
- Russian knapweed **(***Centaurea repens)*
- Garlic Mustard (*Alliaria petiolata*)
- Japanese Knotweed (*Polygonum cuspidatum)*

- Lawnweed *(Soliva sessilis).*

Others may be added as additional information becomes available and new invaders are documented.

Table 1. Summary of invasive plant species and possible control methods to be used, Washington Maritime National Wildlife Complex Refuge.

Species	Priority	Mechanical	Biological	Chemical	Cultural
Cheatgrass Medium		**X**		**X X**	
Musk thistle	**Medium**	**X**	**Seedhead weevil (*Rhinocyllus conicus*)** **Musk thistle weevil (*Trichosirocalus horridus*)**	**X**	
Diffuse, spotted, and meadow knapweed	**High**	**X**	**Broad-nosed seedhead weevil (*Bangasternus fausti)*** **Sulphur knapweed moth (*Agapeta zoegana*)** **Knapweed weevil (*Cyphocleonus achates*)** **Knapweed flowerhead weevil (*Larinus minutus*)**	**X**	
Bohemian knotweed	**High X**			**X**	X
Canada thistle	**Low to Medium**	**X**	**Stem-and-shoot gallfly (*Urophora cardui*)**	**X**	
Bull thistle	**Low-Medium**	**X**		**X**	
Field bindweed	**Low to Medium**		**Field bindweed moth (*Tyta luctuosa*)** **Field bindweed mite (*Aceria malherbae*)**	**X**	
St. Johnswort	**Low to Medium**		**Klamath weed beetle (*Chrysolina quadrigemia*)**		
Dalmatian and yellow toadflax	**High**	**X**		**X**	
Scotch thistle	**Low to Medium**	**X**		**X**	
Common cordgrass	**High**	**X**		**X**	
Blackberries	**Low-Medium**	**X**		**X**	
English Ivy	**Low**	**X**		**X**	**X**
Scotch Broom	**High**	**X**		**X**	

E.9 Non-native Mammal Control

The animals referred to under this category are the non-native predators (rats, red fox, dogs, and cats) and the herbivores (European rabbit). All of these can be controlled using one or more methods. Currently, only rabbits are known to exist on a limited number of islands and in low numbers, but they are expanding. For initial population control, traps would be the preferred method followed by poison bait. Either method would be used to eradicate the population in the quickest, most humane manner with the least impact to other potential non-target animals.

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Appendix F. Area Beaches

F. Introduction

This appendix is a table which lists facilities and approved activities for beach areas in the vicinity of the refuges. Because beach access within the San Juan Islands NWR is extremely limited and trespassing creates wildlife disturbance issues, these beaches offer alternatives for those seeking additional facilities and other wildlife and non-wildlife dependant recreation opportunities.

Beaches in the Vicinity of San Juan Islands NWR & Protection Island NWR

Beach Name	Shore Length (approx. linear feet)	Toilets	Mooring Buoys	Dock	Boat Ramp	Picnic Tables	Picnicking	Beachcombing / Tide Pooling	Walking / Hiking	Mountain Biking / Bicycling	Swimming / Wading	Scuba Diving	Shellfish Harvesting	Fishing	Paddling	Birding	Wildlife Viewing	Other
Agate Beach County Park *San Juan County Parks, Lopez Island*	580	▪				▪	▪	▪	▪			▪						
American Camp - 4th of July Beach *National Park Service, San Juan Island*	2,640	▪				▪	▪	▪	▪		▪			▪	▪			
American Camp - South Beach *National Park Service, San Juan Island*	10,560	▪				▪	▪	▪	▪					▪	▪			
Beach 407 *WA DNR, Quimper Peninsula*	5,016												▪					
Beach 409 *WA DNR, Quimper Peninsula*	1,584												▪					
Beach 410 *WA DNR, Miller Peninsula*	2,640												▪					
Beach 411 *WA DNR, Miller Peninsula*	25,660												▪					
Blackie Brady Memorial Day Park *San Juan County Parks, Lopez Island*	6						▪	▪	▪									
Cattle Point Picnic Area *WA DNR, San Juan Island*	2,795	▪				▪	▪	▪	▪					▪		▪	▪	
Clark Island Marine State Park *WA State Parks, Clark Island*	10,560	▪	▪			▪	▪	▪				▪	▪	▪		▪		
Crescent Beach *San Juan County Land Bank, Orcas Is.*	1,161							▪										
Deception Pass State Park *WA State Parks, Whidbey Is. Fidalgo Is.*	77,000	▪			▪	▪	▪	▪	▪	▪	▪	▪		▪	▪	▪		▪
Eagle Cove Public Access *San Juan County Parks, San Juan Is.*	15,840						▪	▪			▪	▪						▪
East Olga County Park *San Juan County Parks, Orcas Island*	633						▪	▪										
Eastsound Waterfront Park *San Juan County Land Bank, Orcas Is.*	475					▪	▪	▪										
English Camp - Garrison Bay *National Park Service, San Juan Island*	7,920	▪		▪		▪	▪		▪				▪		▪			▪
Fisherman Bay Preserve *San Juan County Land Bank, Lopez Is.*	9,820	▪		▪	▪	▪	▪			▪			▪	▪	▪			▪

Beach Name	Shore Length (approx. linear feet)	Toilets	Mooring Buoys	Dock	Boat Ramp	Picnic Tables	Picnicking	Beachcombing / Tide Pooling	Walking / Hiking	Mountain Biking / Bicycling	Swimming / Wading	Scuba Diving	Shellfish Harvesting	Fishing	Paddling	Birding	Wildlife Viewing	Other
Fort Casey State Park ***WA State Parks, Whidbey Island***	10,560	▪			▪	▪	▪	▪	▪			▪		▪	▪	▪		▪
Fort Ebey State Park ***WA State Parks, Whidbey Island***	26,400	▪			▪	▪	▪	▪		▪	▪			▪	▪	▪		▪
Jackson Beach ***Port of Friday Harbor, San Juan Island***	4,300	▪			▪	▪	▪	▪			▪			▪	▪			▪
Jones Island Marine State Park ***WA State Parks, Jones Island***	25,000	▪	▪	▪			▪	▪	▪			▪	▪	▪	▪			
Joseph Whidbey State Park ***WA State Parks, Whidbey Island***	3,115	▪			▪	▪	▪	▪		▪					▪	▪		▪
Lime Kiln Point State Park ***WA State Parks, San Juan Island***	2,534	▪				▪	▪		▪							▪	▪	▪
Mud Bay County Park ***San Juan County Parks, Lopez Island***	200							▪	▪				▪					
Obstruction Pass Marine Park ***WA State Parks, Orcas Island***	450	▪	▪			▪	▪		▪		▪			▪				
Odlin County Park ***San Juan County Parks, Lopez Island***	3,960	▪	▪	▪	▪	▪	▪	▪	▪		▪	▪	▪	▪	▪			▪
Olga Marine State Park ***WA State Parks, Orcas Island***	60														▪			
Otis Perkins County Park ***San Juan County Parks, Lopez Island***	21					▪	▪	▪	▪			▪						
Patos Island Marine State Park ***WA State Parks, Patos Island***	23,760	▪	▪			▪	▪	▪	▪					▪				
Rueben Tart Park ***San Juan County Parks, San Juan Is.***	870	▪					▪					▪				▪		
San Juan County Park ***San Juan County Parks, San Juan Is.***	2,470	▪	▪		▪	▪	▪	▪			▪	▪		▪	▪			▪
Shaw Island Cnty Park - South Beach ***San Juan County Parks, Shaw Island***	4,593	▪			▪	▪	▪	▪	▪		▪		▪	▪		▪		
Spencer Spit State Park ***WA State Parks, Lopez Island***	7,840	▪	▪			▪	▪	▪	▪				▪	▪	▪	▪		▪
Sucia Island Marine State Park ***WA State Parks, Sucia Island***	77,700	▪	▪	▪		▪	▪	▪	▪		▪	▪	▪	▪	▪	▪		▪
Third Lagoon ***San Juan County Land Bank, SJ Is.***	ND								▪							▪		
Upright Channel Recreation Area ***WA DNR, Lopez Island***	11,600	▪	▪			▪	▪	▪					▪					▪

ND = No Data

Sources: Lucas 2004, Mueller and Mueller 1995, National Park Service 2007, San Juan County Land Bank 2007, San Juan County Parks 2005, Washington Department of Natural Resources 2007, Washington State Department of Ecology 2007, Washington State Parks and Recreation Commission 2007b

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Appendix G. Implementation

G.1. Introduction

Implementation of the CCP will require increased funding, which will be sought from a variety of sources. This plan will depend upon additional Congressional allocations, partnerships, and grants. There are no guarantees that additional federal funds will be made available to implement any of these projects. Other sources of funds will need to be obtained, both public and private. Activities and projects identified will be implemented as funds become available.

The CCP proposes several projects to be implemented over the next fifteen years. Most of these projects are included in the Refuge Operational Needs System (RONS - new staff), or Service Asset Maintenance and Management System (SAMMS - deferred maintenance projects) which are used to request funding from Congress. Currently, a large backlog of maintenance needs exists for Protection Island and San Juan Islands Refuges. In 2009, the deferred maintenance backlog for Protection Island was $1,156,000, with more projects needing to be added. An attempt at reducing this backlog needs to be addressed and is included here in the analysis of funding needs. Prioritized staffing needs identified in the RONS will be necessary to implement the CCP to meet Refuge goals and objectives and legal mandates.

Annual revenue sharing payments, associated with Protection Island NWR in Clallum and Jefferson Counties, will continue. Total payments made in 2008 were $228 for three acres in Clallum County and $49,425 for 317 acres in Jefferson County. Land associated with the San Juan Islands NWR is public domain. Payment In Lieu of Taxes for these acres are made by the Bureau of Land Management to Island, San Juan, Skagit, and Whatcom Counties.

Monitoring activities will be conducted on a percentage of all new and existing projects and activities to document wildlife populations and changes across time, habitat conditions, and responses to management practices. For more details, see the effectiveness monitoring section at the end of this appendix.

G.2 Costs to Implement the CCP

The following sections detail both one-time and recurring costs for various projects in the plan. One-time costs reflect the initial costs associated with a project, whether it is purchase of equipment, contracting services, construction, a research project, etc. Recurring costs reflect the future operational and maintenance costs associated with the project. The following tables primarily document projects with a physically visible, trackable “on-the-ground” component, such as structures, habitat restoration, research, and monitoring and surveys. The scope and costs for “administrative” activities such as MOUs, reporting, and establishment of partnerships are difficult to estimate in advance and thus are not accounted for in the tables below.

A. One-time costs

One-time costs are project costs that have a start-up cost associated with them, such as purchasing a new vehicle for wildlife and habitat monitoring, or designing and installing an interpretive sign. Some are full project costs for those projects that can be completed in three years or less. One-time costs can include the cost of temporary or term salary associated with

a short-term project. Salary for existing and new positions, and operational costs, are reflected in operational (or recurring) costs.

Funds for one-time costs will be sought through increases in Refuge base funding, special project funds, and grants. Projects listed below in Table G-1 show one-time costs, such as those associated with building and facility needs including offices, public use facilities, road improvements, and new signs. One-time costs are also associated with projects such as habitat restoration, invasive plant and animal control, and research. New research projects, because of their short-term nature, are considered one-time projects and include costs of contracting services or hiring a temporary for the short-term project. Some project costs are taken from 2009 RONS or SAMMS proposals; others are not yet in any project database and their costs have been estimated, particularly if the scope of the project is unknown at this time due to lack of baseline data.

Table G-1. One-Time Costs (in thousands) for Research and Assessments; Inventories, Surveys, and Monitoring; Habitat Management and Restoration, Facilities and Public Use-Related Actions

Project Description	Priority	Unit	Cost	Potential Fund Source
Research				
Pre- and post-deer removal study of auklet habitat and vegetation on PI	H Proj.		40 1261	
Pre- and post-habitat restoration glaucous-winged gull breeding success study	H Stud	y	30	1261, Grants
Research grassland restoration methodologies in Puget Trough ecosystem	H Proj.		35	1261
Conduct island-wide rhinoceros auklet breeding success study pre- and post-habitat restoration	H Proj.		75	1261
Hydrological studies on Protection (wetland restoration phase 1), Smith, and Matia Islands	M Stud	y	25	1261 RONS FY10-1740, 2061
Seabird demographic studies	M	Study	175	1261, Grants
Marine mammal demographic studies	M Stud	y	100	1261, Grants
Geomorphologic study of Smith/Minor and Protection Islands	L Stud	y	10	1261, Grants
Subtotal (thousands)			**490**	
Surveys and assessments				
Establish plant herbariums and digital photographic library for habitats	M	Proj.	20	1261 RONS FY08-4913, 6020
Research, design, and implement GIS-based inventory and monitoring	H	Proj.	45	1261 RONS FY08-

programs for plants and wildlife on PI and SJI				4913,6020
Conduct biodiversity assessments (base line inventories)	H #	inventories	148	1261 RONS FY08-4839, 4913, 6020
Conduct forest health assessment	L	Proj.	25	1260 RONS FY08-6137
Survey occupied, formerly-occupied, and Aids To Navigation sites for presence of contaminants	L Proj.		80	1261
Subtotal (thousands)			**318**	
Habitat management and restoration				
Restore PI grasslands to native grasses	H	acres	70	1261 RONS FY08-5973
Restore PI strand to native species	H	acres	15	1261 RONS FY08-5973
Subtotal (thousands)			**85**	
Regulatory and enforcement				
Support new positions stationed in the San Juans. Start-up costs will include a boat, vehicle, office equipment, office space rental, etc.	H		250	1261,1263
Subtotal (thousands)			**250**	
Facilities				
Design, fabricate, and install new "island" boundary and area closed signs	H		30	1262, 1263
Develop site plan for infrastructure-PI	H	Proj.	20	1261
Remove & replace caretaker cabin-PI	H	Proj.	350	1262 SAMMS 2007705142
Replace caretaker cabin septic system-PI	H	Proj.	20	1262 SAMMS 2009943883
Remove & replace research bunkhouse-PI	H	Proj.	550	1262 SAMMS 2008867129
Replace research bunkhouse septic system-PI	H	Proj.	20	1262 SAMMS 2009943880
Remove & replace office -PI	M	Proj.	200	1262 SAMMS 88101548
Replace office septic system-PI	M	Proj.	20	1262 SAMMS 2009943886
Remove toxic PI marina pilings	H	Proj.	87	1262, refuge contaminate funds

Construct and replace nontoxic PI marina pilings	H	5 at $2000 each	86	1262 SAMMS 2009917570
Establish photovoltaic system for PI	H	Proj.	150	1262 SAMMS 2009924800
Replace water distribution system PI	M	Proj.	384	1262 SAMMS 2009943301
Replace boat launch ramp at PI	L	Proj.	65	1262 SAMMS 2008867122
Remove fire cache and two abandoned residences on PI	H	Proj.	150	1262
Remove human-generated debris form Smith and Minor islands	M	Proj.	100	1262, partner w/USCG
Subtotal (thousands)			**2,232**	
Public use				
Design, construct, and install interpretive panels for PI and SJI	H		120	1263 SAMMS 97122612, 2009917578
Develop SJI NWR brochure, rack cards, posters, and video	H		80	1263 RONS FY10-2056
Develop cultural outreach and educational material	M		10	1263
Subtotal (thousands)			**210**	
Total of all one time project costs			**3,585**	

B. Annual Operational (recurring) costs

Operational costs reflect Refuge spending of base funds allocated each year. These are also known as recurring costs and are usually associated with day-to-day operations and projects that last longer than three years. Operational costs use base funding in Service fund code 1260.

Table G-2 displays projected annual operating costs under the CCP. The CCP will require increased funding for new or expanded public uses and facilities, habitat restoration and conservation activities, and new monitoring needs. This table includes such things as salary and operational expenditures such as travel, training, supplies, utilities, and maintenance costs. Project costs listed in Table G-2 include permanent and seasonal staff needed year after year to accomplish each project; these staffing costs are not isolated in this table but are included as part of the entire project cost.

Table G-2. Annual Operational (recurring) Costs

Activity Description	Cost est (K)
Surveys and assessments: Aerial photographic surveys; boat-based and land	150

survey and assessments; joint wildlife surveys with WDFW; implement GIS-based inventory and monitoring programs for plants and wildlife; mammalian predator and invasive species monitoring; monitor biodiversity trends; provide administrative and material support for all biological activities.	
Research: Facilitate and cooperate in specific research projects to benefit refuge resources.	22.3
Habitat management and restoration: Inventory, remove, control, and prevent new establishment of invasive plants and treat infestations with IPM; periodic mowing and burning of grassland and spit restoration areas.	94.3
Regulatory and enforcement actions: Patrol islands, enforce regulations, and educate visitors to the sensitivity of wildlife resources; replace boundary and regulatory signage as needed; conduct outreach.	73.0
Public use opportunities and education: Provide funding for and manage a variety of both on-refuge and off-refuge interpretive and education programs; maintain Protection Island and San Juan Islands NWR interpretive panels located both on- and off-refuge to offer interpretation through self-guided experience; conduct and manage volunteer environmental education stewardship projects; manage college-level environmental studies program; initiate volunteer interpretation program including logistical and financial support.	180.3
Facilities maintenance: Maintain and make minor repairs on interpretive panels and regulatory signage; maintain Protection Island infrastructure and facilities; maintain boats, vehicles, tractor, equipment, and tools for use as needed	87.9
Total Recurring Costs	**607.8**

C. Maintenance costs

The maintenance need over the next 15 years is defined as funds needed to repair or replace buildings, equipment, and facilities. Maintenance includes preventative maintenance; cyclic maintenance; repairs; replacement of parts, components, or items of equipment; adjustments, lubrication, and cleaning (non-janitorial) of equipment; painting; resurfacing; rehabilitation; special safety inspections; and other actions to assure continuing service and to prevent breakdown. Maintenance costs include the maintenance "backlog"—maintenance needs that have come due but are as yet unfunded, as well as the increased maintenance need associated with new facilities.

The facilities associated with San Juan Islands and Protection Island NWRs that require maintenance include trails, interpretive panels, regulatory signs, roads, water delivery system, buildings, dock, and marina. Major equipment includes boats, vehicles, tractors, ATVs, and generators. Approximately 60 percent of operational (non-project) maintenance funding for the Washington Maritime NWR Complex is expended on the two refuges covered under this CCP (also see Table G-2); the other approximately 40 percent is used to maintain the majority of facilities, including buildings and equipment, which are located on the other three Complex Refuges and are not included in this Implementation Plan. One-time costs for buildings and associated infrastructure replacement for Protection Island and replacement of island boundary and regulatory signs are identified in Table G-1

D. Staffing

Current and proposed staffing are shown in Table G-3. Current positions serve all six refuges within the Washington Maritime NWR Complex; because there is no separate budget for the

individual refuges, we have chosen to present the entire Complex staff in Table G-3. Approximately 40 percent of current Complex staff time is expended on the two refuges covered under this CCP; the other approximately 60 percent of staff time is expended on the other four refuges in the Complex. Two of the four new positions (Wildlife Refuge Manager and Park Ranger (.5 FTE)) will work fulltime on San Juan islands NWR. The Wildlife Biologist is anticipated to work 70 percent of the time on San Juan Islands and Protection Island NWRs and the Supervisory Park Ranger 50 percent of the time.

Table G-3. Costs of salary, benefits, and other expenditures associated with current and proposed new positions for Washington Maritime NWRC Staff.

Staff-Refuge Operations	FTE	Staff Position	Complex Costs[1] (K)	PI/SJ Costs[2] (K)	RONS #
Refuge Manager	1.0	GS-485-12	123.0	61.5	N/A
Deputy Refuge Manager	1.0	GS-485-11	86.8	52.0	N/A
Wildlife Biologist	1.0	GS-486-11	89.5	22.0	N/A
Park Ranger/ Volunteer Coordr.	1.0	GS-025-9	71.8	38.7	N/A
Maintenance Worker	1.0	WG-4749-8	78.9	42.0	N/A
Office Auto Clerk	1.0	GS-326-4	43.6	17.4	N/A
Refuge Manager *	1.0	GS-485-9/11	78.9	78.9	FY08-4801
Wildlife Biologist*	1.0	GS-486-7/9	65.2	45.6	FY08-4839
Sup Park Ranger *- VSS	1.0	GS-025-11	78.9	39.5	FY08-5190
Park Ranger *	0.5	GS-025-7/9	32.9	32.9	FY08-4827
Totals	9.5		**749.5 430.**	**5**	

*Proposed new positions
1= Costs are based on FY 2009 FTE utilization plans for Washington Maritime NWR Complex and OPM General Schedule FY 2009 plus 40% benefits. For new positions, we took step one grade plus 40%.
2=Portion of total Complex costs that are associated with work just on Protection Island and San Juan Islands Refuges

Table G-3 shows a 3.5 full-time-equivalent (FTE) increase in staffing over current levels. Proposed additions include Wildlife Refuge Manager, Wildlife Biologist, Supervisory Park Ranger (Visitor Services Specialist) and Park Ranger.

The Refuge Manager position is proposed to be stationed in the San Juan Archipelago and will be responsible for all refuge programs on San Juan Islands NWR. This position will be a "dual function" position meaning the individual will have law enforcement capabilities to enhance visitor safety and resource protection. Stationing this position in the San Juans will result in continuous Service presence interacting with local government, Federal, and State agencies present in the San Juans, local NGOs, user groups, citizens and visitors.

The Wildlife Biologist will work with the Complex Wildlife Biologist in coordination and implementation of the overall biological program in the San Juan Islands NWR and assist as needed with the biological program on other refuges in the Complex. This position will facilitate increased coordination with other Federal and State agencies,Tribes, and will greatly improve the

Complex's ability to address the biological complexity of these two Refuges. This position is anticipated to devote 70 percent of its time to Protection Island and San Juan Islands NWRs.

The Supervisory Park Ranger will serve as a visitor services specialist to guide the public use program of the Complex, including environmental education, interpretation, outreach, and the volunteer program. This position will facilitate informing the public about the refuges in the Complex, educating and interpreting the public on marine-dependent wildlife species and the impacts of such issues as human disturbance, loss of habitat, marine debris, ocean acidification, and global climate change. This position is anticipated to spend approximately 50 percent of its time on San Juan Islands and Protection Island NWR projects.

The Park Ranger will be a ½ full time equivalent and will provide seasonal assistance to the Refuge Manager during those times of the year that these two Refuges are most vulnerable to human disturbance. Interacting, educating, and interpreting to residents, visitors, and user groups is anticipated to reduce disturbance incidents and give the public an appreciation of the needs of wildlife species in the area and the importance of the National Wildlife Refuges in meeting those needs.

E. Budget summary

Table G-4 summarizes the data from tables G-1 and G-2 and displays the overall funding need for the Washington Maritime NWR Complex to implement the CCP in full.

Table G-4, Budget Summary – One-time projects and annual funding needs for Protection Island and San Juan Islands NWR as identified in the CC

Budget Category		
	One-time cost (K)	Annual recurring cost (K)
Research	490.0	22.3
Surveys and assessments	318.0	150.0
Habitat management and restoration	85.0	94.3
Regulatory and enforcement actions	250.0	73.0
Public use opportunities and education	210.0	180.3
Facilities and maintenance	2,232.0	87.9
Totals	**3,585.0**	**607.8**

G.3. Step-Down Plans

Step-down plans are prepared when they are required by Service policy or when they are needed to provide additional details to implement the CCP. The following table identified step-down plans, their status, and relationship to this CCP.

Step-down Plan	Status
Safety Plan 2006	**Current**
Integrated Pest Management Plan 2011	**Current, this plan is included as Appendix E in the CCP.**
San Juan Islands Wilderness Stewardship Plan	**No separate plan is needed as the CCP includes detailed public use goals, objectives, and strategies.**
Protection Island and San Juan Islands Sign Plans 2011	**Current, these plans are included in Appendix D of the CCP**
Public Use Plan	**No separate plan is needed as the CCP includes detailed public use goals, objectives, and strategies.**
Inventory and Monitoring Plan 1988	**Needs to be updated**
Fire Management Plan 2004	**Needs to be updated**
Deer Removal Plan	**Needs to be developed**
Protection Island Infrastructure plan	**Needs to be developed**

G.4. Partnership Opportunities

Partnership Opportunities

Partnerships are an important component of the implementation of this CCP and are reflected in the goals, objectives, and strategies identified in Chapter 2. The Refuges' locations (Olympic Peninsula and San Juan Archipelago) facilitate many opportunities for partnerships. Current and past partners include federal and state agencies, Tribes, non-governmental organizations, schools volunteers, and individuals.

Coordinated partnerships efforts will focus on habitat restoration, land protection, environmental education, fish and wildlife monitoring, outreach, and quality wildlife-dependent recreation. Refuge Complex staff will work to strengthen existing partnerships and will actively look for new partnerships to assist in achieving the goals, objectives, and strategies in this CCP/WSP.

U.S. Coast Guard

The Coast Guard maintains aids to navigation on 17 refuge islands within San Juan Islands NWR (See Appendix A). The Service has worked with USCG to schedule service of these aids during periods of low wildlife use (See Appendix F). In addition, the Service will work with USCG on debris removal from Smith Island when they abandon their facilities there.

National Oceanic and Atmospheric Administration

National Oceanic and Atmospheric Administration – Fisheries conducts research and monitors marine mammals in the Salish Sea. These activities are managed under a Special Use Permit when conducted on Refuge lands and have involved Steller sea lions and elephant and harbor seals.

Washington Department of Fish and Wildlife (WDFW)

WDFW's management responsibilities, including lands and waters, fish and wildlife, threatened and endangered species, and other programs, frequently overlap with Service resources and responsibilities. WDFW and other state agencies are in a unique position to greatly assist the Complex in protecting sensitive seabirds and pinnipeds from human disturbance in close proximity to the Refuges. WDFW and the Complex share mutual interests in species management, wildlife surveys, developing joint research projects, and education and outreach programs. WDFW has been closely involved with the Complex in waterfowl surveys, pinniped surveys, black oystercatcher and pigeon guillemot surveys, forage fish spawning beach surveys, and review of Complex projects in the marine environment (Protection Island marina entrance dredging and creosote bulkhead removal).

WDFW and the Service have a unique relationship regarding the management of Protection Island. WDFW is the managing agency on the 48-acre Zella M. Schultz Seabird Sanctuary while the Service manages the remainder of the island. A Memorandum of Understanding (MOU) between the Service and WDFW formalizes both parties' commitment to the protection and enhancement of the wildlife resources of Protection Island and ensures that each agency's management approach is compatible and complimentary. (See Appe

Washington Department of Natural Resources (WDNR)

WDNR is the agency that manages State-owned aquatic lands. On November 22, 1988, WDNR issued a withdrawal order for "The bedlands of navigable water owned by the state of Washington, surrounding Protection Island extending waterward 600 feet from the line of extreme low water,…" (Withdrawal Order 88 017). Under this withdrawal order, these bedlands "shall be reserved and withdrawn from conflicting uses…" In January 1994 the Service received a 20-year lease for all the tidelands of the second class surrounding Protection Island (Aquatic Lands Lease No. 20-013245). "Lessee shall have use of the Property only for the specified purposes of a portion of the National Wildlife Refuge System…" This 340-acre tideland lease is due to expire on December 31, 2013. The withdrawal and lease have been critical in the Service's ability to manage these areas for the benefit of the islands wildlife and to protect against human disturbance. The Service is working with WDNR on renewal of this lease and expanding this partnership to the San Juan Islands NWR.

Washington State Parks (WSP)

The Service has had a long term relationship with WSP. In 1959, WSP and the Service entered into a 10-year agreement for the State to develop and operate facilities on Turn, Matia, and Jones Islands. Jones Island was transferred to the State in 1982. An MOU was established in 1983 replacing the original 1959 agreement. This agreement was updated in 1987 and 2010 and outlines the Service and State responsibilities in general and specifically for Matia and Turn Islands. The MOU will be updated again upon finalization of this CCP to reflect any changes required. Washington State Parks manages the camping program and facilities, composting toilets, and mooring buoys at Turn and Matia Islands, and a seasonal dock at Matia Island and

conducts law enforcement activities associated with their use. The Service will continue to work with State Parks to ensure these activities support wildlife dependent recreation and expand our interpretation and environmental education capabilities.

Washington Department of Ecology (DOE)

One of Washington Department of Ecology's programs is spill prevention, preparedness, and response. This program focuses on prevention of oil spills to Washington State waters and lands, as well as effective responses to oil and hazardous substance spills whenever they occur. The Service will continue its partnership with DOE in support of a Response Tug at Neah Bay; maintenance of a regional contingency plan that guides how spills are managed in the Northwest; and in the development and periodic review of Geographic Response Plans.

The Whale Museum

The Service has long partnered with the Whale Museum in Friday Harbor. The Museum promotes stewardship of whales and the Salish Sea ecosystem through education and research. The Whale Museum's Soundwatch Boater Education Program has partnered with the Service for close to 15 years. The boundary waters of the U.S. San Juan and Canadian Gulf Islands are one of the highest density whale watching areas in the world. Boating traffic is high in the whale watching season from May through September. This program was developed to respond to traffic and its effects on marine species. While this program primarily educates whale watching boaters in proper watching protocol, it has also taken on the additional effort of San Juan NWR patrols. They educate boaters in the vicinity of refuge islands about island closures and the requested 200-yard buffers to avoid disturbance, and they hand out refuge maps. Soundwatch also assists the Service by providing information and brochures at marinas, marine parks, and visitor areas likely to reach boaters and commercial eco-tourism operators in San Juan County.

Port Townsend Marine Science Center

The Port Townsend Marine Science Center is an educational and scientific organization promoting coastal education and conservation. They offer off-refuge education and interpretation for Protection Island NWR through their wildlife cruises. A spring bird migration cruise is offered in April; Protection Island puffin cruises in July and August; and fall migration cruises in October and November. Naturalists from the Marine Science Center serve as on board interpreters and provide commentary on local birds, mammals, geology, history, and weather.

Recently the Service has collaborated with the Marine Science Center studying marine debris. Bolus from glaucous-winged gulls on Protection Island are collected and given to the Marine Science Center. Students dissect the bolus and look for marine debris (plastics).

Islands' Oil Spill Association (IOSA)

Islands' Oil Spill Association is a non-profit, community-based oil spill response organization that provides prompt, effective, local oil spill response and prevention throughout San Jaun County and is the only oil spill response organization in the San Juan Islands. The refuge has worked with IOSA to place rock anchor bolts on Fortress, Crab, and Blind Islands to attach oil booms to protect the island's and associated bay's resources, should the need arise.

The Nature Conservancy (TNC)

The Service has partnered with TNC to conduct baseline vegetative surveys for many of the islands within the refuge. TNC also manages lands in the San Juan Islands and the Service has worked with them at the Yellow – Low island complex. Yellow Island is a TNC property and Low Island a refuge island. The waters surrounding them are a marine protected area administered by the University of Washington and closed to salmon and rock fish fishing. Working with the Yellow Island caretaker the Service has permitted the installation of informational signage on Low Island regarding this closure. The Yellow Island caretaker interacts with boaters who come too close or trespass on Low Island and informs them of the island's closed-to-public-use status and disturbance effects.

San Juan County Marine Resource Committee (SJMRC)

The Service has worked with SJMRC for a number of years as the refuge islands and their resources are important components of the marine ecosystem of the San Jauns. The Service participated in the development of the SJMRC's Marine Stewardship Plan which includes actions to reduce seabird disturbance. Refuge staff participates in Marine Managers Workshops hosted by the SJMRC that draw resource managers together to assist the SJMRC with action items in the Plan and provide information on issues and work planned by each group for the coming year.

Corinthian Yacht Club of Bellingham

The Corinthians have conducted an annual Matia Island clean-up for a number of years as a club project. The club has worked with the Service and Washington State Parks on this project, which has included marine debris removal, wilderness trail maintenance, English ivy removal, and campground "spring cleaning".

Audubon Chapters

The Service's National Wildlife Refuge System has long enjoyed a relationship with the Audubon Society. Many chapters have "adopted" a national wildlife refuge and assist with a variety of projects. Admiralty Audubon was instrumental in the establishment of Protection Island NWR. Members of local societies including, but not limited to, Admiralty Audubon, San Juan Island Audubon, Skagit Audubon, Whidbey Island Audubon, and North Cascades Audubon are sources of volunteers who could assist with a host of biological and management projects.

Washington State University Beach Watchers Program

This program is run by the WSU Extension. Volunteers receive 100 hours of training from WSU in the physical, biological, and cultural aspects of marine stewardship. In return, after they are trained, they provide 100 hours of volunteer service to the community through education, research, and stewardship. The program is broken down by county and is an excellent source of citizen science volunteers.

People For Puget Sound

People for Puget Sound is a citizens' group established in 1991 to protect and restore the lands and waters of the Puget Sound Basin through education and action. Their vision of a clean and healthy Sound teeming with fish and wildlife complements the vision statements of Protection Island and San Juan Islands NWRs. Programs of People for Puget Sound that support Refuge

needs include Sound Stewardship, Safeguarding Shorelines, Alliance for Puget Sound Shorelines, Preventing Oil Spills, Toxics in Puget Sound, and Education and Involvement.

Puget Sound Partnership

The Puget Sound Partnership is a community effort of citizens, governments, tribes, scientists, and businesses working together to restore and protect Puget Sound. The Partnership was charged by the Governor and the Washington State legislature to create an Action Agenda that will lead to a healthy Puget Sound. The Action Agenda prioritizes cleanup and improvement projects, coordinates federal, state, local, tribal, and private resources, and ensures all are working cooperatively. The Service will participate in the Partnership through implementation of a number of strategies outlined in the CCP (e.g., monitor, and when found, remove marine debris and contaminated material).

G.5. Effectiveness Monitoring

Effectiveness monitoring refers to monitoring and evaluation used to determine whether or not implemented strategies are effective in making progress toward meeting CCP objectives. Careful monitoring of progress toward meeting CCP objectives provides informed support for sound decision-making regarding refuge resource management and is critical to the application of adaptive management principles. Monitoring tasks would be implemented as their associated objectives/strategies are implemented. Monitoring techniques identified below may change based on funding and personnel availability as well as in response to advancements in monitoring methods.

Table G-6. Effectiveness Monitoring for Habitat Objectives under Goals 1-5

Note: $ = can accomplish with existing refuge funding; $$ = some additional funding needed; $$$ = significant funding needed such as a special grant.

Obj. #	Effectiveness Measures	Method	Reliability	Time Factors	Cost Factors	Personnel	Links to Regional monitoring efforts
1.1, 2.1, 2.2	Presence/absence or % cover non-native and native vegetation	Line intercept transect method	Excellent, standard method	1-2 days during the non-breeding season of birds or use by seals	$ Staff,	volunteers, research partners	
1.1, 2.1, 2.2, 3.1, 4.1	Disturbance to seabird nesting habitat and other BIDEH on PI from deer.	Island-wide survey of deer/season/habitat type; observations of deer in auklet and gull colonies/24-hr period (% time spent in the colonies and direct impacts observed); degree of wear in deer trails; investigate slope failure and	Good to excellent	7-10 days per season	$$ Staff,	volunteers, research partners	None

Obj. #	Effectiveness Measures	Method	Reliability	Time Factors	Cost Factors	Personnel	Links to Regional monitoring efforts
		determine possible causes; conduct deer exclosure studies in savannah and forested habitats.					
1.1, 2.1, 2.2, 3.1, 4.1	Presence/absence of rats, rabbits, or other mammalian predators on PI	Look for signs (scat, tracks, fur, etc). If suspected, set up more formal survey methods such as rat boxes, track plates, or cameras.	Good	Can routinely look for signs while doing other work on the island.	$ to look for signs $$ to conduct a more formal survey.	Staff, volunteers	None
1.1,1.2 1.3	# of islands free of debris	Shoreline and trail surveys	Excellent	PI-2X per year (Spring, Fall) SJ-Smith/Minor Islands annually, Matia and Turn-2X per year, other accessible islands 1X/5year on rotational basis	$ $$ $	Staff and volunteers	Staff and volunteers
1.2	Spit length, increasing measured at mean low tide	Photo point, marker stake	Excellent	2-3 years	$	Staff	None
1.2,1.3, 3.2, 3.3, 4.2, 5.1, 5.2	Presence/absence of rats, rabbits, or other mammalian predators on SJI	Look for signs (scat, tracks, fur, etc). If suspected, set up more formal survey methods such as rat boxes, track plates, or cameras.	Good	Can routinely look for signs while doing other work on the island.	$ to look for signs $$ to conduct a more formal survey.	Staff, volunteers	None

Obj. #	Effectiveness Measures	Method	Reliability	Time Factors	Cost Factors	Personnel	Links to Regional monitoring efforts
1.2	# of elephant and harbor seals on PI	Elephant and harbor seal census by boat	Good Br	eeding and molt periods	$ B	iologist, Boat Operator	WDFW, NOAA
1.2	# of pigeon guillemot and black oystercatcher nests in the driftwood on PI and Smith	Area nest searches	Fair	2-3 days annually	$$ Staff,	volunteers, research partners	None
1.3	# of breeding seabirds and oystercatchers per refuge island	Boat Surveys	Good	1 Survey/Season – All Islands 2-3 Surveys/breeding season – Turn/Matia	$ B	iologist, 1 volunteer, Boat Operator	Some applicability with the California Current Seabird Monitoring Plan (under development)
1.3	# of prickly pear cactus populations	GPS, photo	Excellent	Annually	$	Staff, volunteers	None
1.3	# of trespass incidents on Turn and Matia along shorelines	Boat surveys	Good	Annually, anytime working in the area, particularly April-September	$ Staff,	volunteers	None
1.3	# of marine mammals flushed by people from any rookery islands	Incidental observations	Fair		$	Staff, partners, volunteers	Sound Watch, NOAA, WDFW
2.1	Miles of road, # of buildings, # of other structures	Measure, count	Excellent	As needed for data called and to add or delete property	$ staf	f	None
2.1	Degree of slope and		Good	Pre- and post-	$$	Staff,	None

Obj. #	Effectiveness Measures	Method	Reliability	Time Factors	Cost Factors	Personnel	Links to Regional monitoring efforts
	friability of soil			restoration		volunteers	
2.1, 2.2	# of burrows per square meter	Measure number and density of rhinoceros auklet burrows in restoration plots compared to adjacent control plots.	Excellent	Before and after structural removal vegetation establishment	$$ B	iologist, research partners	None
2.1, 2.2	# of plants, patches, or presence/absence of scotch broom and other invasive shrubs on bluffs.	Boat and land surveys with binoculars if they are higher	Fair to Good from Boat, Excellent on land	Annually as part of other surveys or maintenance projects, if nothing planned for the particular island then once every 3 years	$ Staff,	volunteers	None
2.1	Bluffs have 50% vegetative cover for rainy season	Photo and boat surveys	Good	Annually	$	Staff, volunteers	None
3.1, 4.1	% cover of invasive vegetation or native vegetation	Line intercept	Excellent	Monitor before and/or after bird breeding season.	$ Staff,	volunteers	None
3.1, 3.2, 3.3, 4.1, 4.2	% cover of trees and/or shrubs	Line intercept, aerial photos	Excellent 5-10	years??	$	Staff, volunteers	None
3.1, 3.2, 3.3	% cover of native and non-native grasses and forbs.	Line intercept transects or quadrats	Excellent TBD		$$	Staff, volunteers	State of Washington, TNC, USFWS
3.1, 3.3	Presence/absence or % cover of butterfly host plant species	GPS, Point counts and Line intercept transect method	Excellent Annu	ally	$	Staff, volunteers, WDFW	Butterfly recovery plan: Island silver spot??

Obj. #	Effectiveness Measures	Method	Reliability	Time Factors	Cost Factors	Personnel	Links to Regional monitoring efforts
3.1, 3.3, 4.1	Map acres restored and % cover of targeted native species within restored areas	GPS/GIS, Line intercept transects	Excellent	TBD	$$	Staff, volunteers	None
3.1, 3.2, 3.3	Presence/absence of rare/endemic plant populations	GPS, Point counts and Line intercept transect method	Excellent Annu	ally	$	Staff, volunteers,	Golden paintbrush recovery plan
3.1, 3.2, 3.3, 4.1	Presence/absence of targeted species	Walking surveys, GPS, researchers and caretaker plant identification training	Good to Excellent	Annually	$	Staff, volunteers	None
4.1, 4.2	# of eagles nesting on PI and eagle territories encompassing islands in the SJI NWR	TBD	TBD			Bald	Eagle Delisting Monitoring Plan
4.2	Acres of Dry Douglas-Fir Forest	Line intercept, aerial photos	Excellent 5-10	years??	$	Staff, volunteers	
4.2	Acres of old-growth	Line intercept, aerial photos	Excellent	5-10 years??	$	Staff, volunteers	
5.1, 5.2	Presence/ absence of aquatic invasive animals or plants such as green crabs, bullfrogs, purple loosestrife, and spartina	GPS, Point counts and Line intercept transect method and crab pots , calling frog survey	Excellent, standard method	Annually $		Staff, volunteers	None
5.1, 5.2	Hydrological study completed	Yes/no Excel	lent	TBD	$$	Hydrologist	None

Table G-6. Effectiveness Monitoring for Visitor Services and Wilderness Objectives under Goals 6-8
Note: $ = can accomplish with existing refuge funding; $$ = some additional funding needed; $$$ = significant funding needed such as a special grant.

Obj. #	Effectiveness Measures	Method	Reliability	Time Factors	Cost Factors	Personnel	Links to Regional monitoring efforts
6.1	% of visitors who know they are on a wildlife refuge and that wildlife come first	Visitor contacts and tracking	Fair	Annual, ongoing	$$ SJI	NWR staff, complex staff, volunteers, partners	
6.1	% of visitors who know there are other refuge islands in the San Juan Archipelago and why they are closed	Visitor contacts and tracking	Fair A	nnual, ongoing	$$ SJI	NWR staff, complex staff, volunteers, partners	
6.1	% of violations	Observation, # Violation Notices and % change over time	Fair 5	Years	$$$	State and Federal Law Enforcement personnel, SJI NWR staff, complex staff, volunteers, partners	USFWS uniform crime reporting system, State Parks incident and violation tracking
6.1	# of violations	Observation, # Violation Notices	Fair A	nnual, ongoing	$$$ State	and Federal Law Enforcement personnel, SJI NWR staff, complex staff, volunteers, partners	USFWS uniform crime reporting system, State Parks incident and violation tracking
6.2	% of visitors who know they are in an old growth forest on Matia Island	Visitor contacts and tracking	Fair A	nnual, ongoing	$$ SJI	NWR staff, complex staff, volunteers,,	USFWS uniform crime reporting

Obj. #	Effectiveness Measures	Method	Reliability	Time Factors	Cost Factors	Personnel	Links to Regional monitoring efforts
						partners sy	stem, Washington State Parks incident tracking
6.2	% of visitors that can name at least one species associated with old growth island habitat	Visitor contacts and tracking	Fair A	nnual, ongoing	$$ SJI	NWR staff. complex staff, volunteers, , partners	
6.2	% of visitors that can name at least one species associated with shoreline habitat	Visitor contacts and tracking	Fair A	nnual, ongoing	$$ SJI	NWR staff, complex staff, volunteers, partners	
6.2	% of refuge visitors who know that humans and pets disturb wildlife and their habitat and can identify at least one negative impact of such disturbance	Visitor contacts and tracking	Fair O	ngoing	$$	State and Federal Law Enforcement personnel, SJI NWR staff, complex staff, volunteers, partners, visitors	
6.3	Number of habitat enhancement stewardship projects completed annually	Quantify number of projects &,assess success through monitoring	Very good	Annual	$$-$$$	SJI NWR staff, complex staff, academic institution staff, partners	Academic program requirements, possible project specific regional monitoring efforts
6.3 Num	ber of stewardship project participants that	Pre- and post-project assessments	Very good	Project specific	$	SJI NWR staff, complex staff,	

Obj. #	Effectiveness Measures	Method	Reliability	Time Factors	Cost Factors	Personnel	Links to Regional monitoring efforts
	can identify at least 3 adverse impacts of invasive species, marine debris and/or human-caused wildlife disturbances					academic institution staff, partners	
6.4 Num	ber of student research projects conducted	Counting	Very Good	5 Years	$$	SJI NWR staff, complex staff, academic institution staff, partners	Possible project specific
6.4	% of projects that contribute to both student and refuge knowledge	Pre- and post-project assessments	Good	5 Years	$$	SJI NWR staff, complex staff, academic institution staff, partners	Possible project specific
7.1	% of visitors to the area who know there is a National Wildlife Refuge in the San Juan Archipelago and know the conservation mission of the National Wildlife Refuge System	Contacts, tracking, and/or OMB-approved survey	Good A	nnual, ongoing, OPM survey 3 times during plan life (15 years)	$$$ SJI	NWR staff, complex staff, volunteers, partners, graduate student, contractor,	
7.1	% of visitors to the area who know that refuge islands provide key habitat for seabirds and marine mammals and how to observe wildlife without causing disturbance	Contacts and tracking	Good	Annual, ongoing	$ SJI	NWR staff, complex staff, volunteers, partners	
7.1	% of Visitors to the area who know when and where	Contacts and tracking	Fair	Annual, ongoing	$$ SJI	NWR staff, complex staff,	

Obj. #	Effectiveness Measures	Method	Reliability	Time Factors	Cost Factors	Personnel	Links to Regional monitoring efforts
	the best wildlife viewing opportunities are and how to maximize those opportunities through minimizing disturbance					volunteers, partners	
7.2	% of government and tribal officials and local citizens who know of the San Juan Islands NWR and that it provides key habitat for a variety of wildlife including seabirds and marine mammals	Contacts and tracking, possible social research project and/or OMB-approved survey	Very Good	Annual, ongoing, may need to allow time for OMB approval for social research project	$$ SJI	NWR staff, complex staff, volunteers, partners, graduate student	
7.2	% of government and tribal officials and local citizens who understand the conservation mission of the National Wildlife Refuge System	Contacts and tracking, possible social research project and/or OMB-approved survey	Very Good	Annual, ongoing, may need to allow time for OMB approval for social research project	$$ SJI	NWR staff, complex staff, volunteers, partners, graduate student	
7.3	% of area boaters who know Protection Island is a NWR	Contacts and tracking, possible social research project and/or OMB-approved survey	Fair A	nnual, ongoing, may need to allow time for OMB approval for social research project	$-$$ SJI	NWR staff, complex staff, volunteers, partners, graduate student	USFWS uniform crime reporting system, State Parks incident and violation tracking
7.3, 8.2	% of pilots who maintain a 2,000-foot minimum ceiling above refuge islands	Observation and tracking	Fair	Annual, ongoing	$-$$ SJI	NWR staff, complex staff, volunteers, partners	USFWS uniform crime reporting system, State Parks incident and violation

Obj. #	Effectiveness Measures	Method	Reliability	Time Factors	Cost Factors	Personnel	Links to Regional monitoring efforts
							tracking
7.3	% of area boaters who know why it is important to maintain a 200-yard disturbance buffer around Protection Island NWR	Contacts and tracking, possible social research project and/or OMB-approved survey	Fair A	nnual, ongoing, may need to allow time for OMB approval for social research project	$-$$ SJI	NWR staff, complex staff, volunteers, partners, graduate student	
7.3	% of area boaters who know which rocks, islands, and islets are part of the San Juan Islands NWR	Contacts and tracking, possible social research project and/or OMB-approved survey	Fair A	nnual, ongoing, may need to allow time for OMB approval for social research project	$-$$ SJI	NWR staff, complex staff, volunteers, partners, graduate student	
7.3	% of area boaters know why it is important to maintain a 200-yard disturbance buffer (or as close to 200 yards as possible) around refuge islands in the San Juan Islands NWR	Contacts and tracking, possible social research project and/or OMB-approved survey	Fair A	nnual, ongoing, may need to allow time for OMB approval for social research project	$-$$ SJI	NWR staff, complex staff, volunteers, partners, graduate student	
7.3	% of area boaters know that wildlife comes first in refuges	Contacts and tracking, possible social research project and/or OMB-approved survey	Fair A	nnual, ongoing, may need to allow time for OMB approval for social research project	$-$$ SJI	NWR staff, complex staff, volunteers, partners, graduate student	
7.4 Num	ber of refuge interpretive products or programs created that	Quantify number of refuge interpretive products that focus primarily on cultural	Very Good	Annual, ongoing	$$-$$$ SJI	NWR staff, complex staff, volunteers ,	None

Obj. #	Effectiveness Measures	Method	Reliability	Time Factors	Cost Factors	Personnel	Links to Regional monitoring efforts
	focus primarily on interpretation of cultural and/or paleontological resources	and/or paleontological resources				partners, contractor	
7.4	All appropriate refuge educational products include interpretation of cultural and paleontological resources	Quantify number of products and % of products that interpret cultural resources and paleontological resources	Very good	Annual, ongoing	$$-$$$ SJI	NWR staff, complex staff, volunteers , partners, contractor	None
8.1	Total number of signs installed consistent with minimum requirement analysis.	Inspect and count all signs	Very good	Annually visit ¼ of the islands	$ SJI	NWR staff, volunteers,	
8.2	Survey for visitor numbers or boats during peak visitation periods	Boat or land-based observations	Good A	nnually	$	Refuge staff,	None
8.2 R	eduction of non-wilderness intrusions on wilderness islands	Assess wilderness quality through observation, possible OMB-approved survey, possible audio/video recording	Good Mo	nthly, annual, ongoing	$$ SJI	NWR staff, volunteers, partners, contractor, graduate student	Wilderness Act requirements
8.3	# of visitors know that the refuge is also a wilderness area	Possible OMB-approved survey	Good W	ithin 3 years after interpretative panels are installed	$$ SJI	NWR staff, volunteers, partners, contractor, graduate student	None

Appendix H – Wilderness

This appendix includes a number of items related to management of wilderness lands and review of non-wilderness lands to determine their suitability for wilderness designation.

The following elements are included:
H.1. Wilderness Stewardship Plan (WSP) Components within CCP/WSP/EA
H.2. Wilderness Reviews
H.3. Minimum Requirement Analysis-Signs
H.4. Minimum Requirement Analysis- Research, Monitoring, and Management

H.1 Wilderness Stewardship Plan (WSP) Components within CCP/WSP

U.S. Fish and Wildlife Service (Service) policy (Part 610, Wilderness Stewardship) provides guidance for managing, as well as planning for management of, wilderness areas within national wildlife refuges. 610 FW 3 Exhibit 1 outlines the required components of a Wilderness Stewardship Plan, which is required for every wilderness area under Service management.

610 FW 3 describes a WSP as a step-down management plan that guides the preservation, stewardship, and use of a particular wilderness area. The policy states that where the majority of a refuge is designated wilderness, we may prepare a detailed CCP that incorporates the required elements of a WSP rather than preparing a separate WSP. This CCP incorporates the required elements of a WSP.

Location of WSP components within the Protection Island and San Juan Islands National Wildlife Refuges CCP and the San Juan Island WSP are described by the following wilderness stewardship plan outline.

Wilderness Stewardship Plan Outline
(Exhibit 1, 610 FW 3)
1.1. Introduction.

A. Information on wilderness establishment for the San Juan Islands Wilderness Area, including contents of pertinent laws, date(s) of establishment, and boundary or other legal changes, can be found in Chapter 1. Pertinent committee report discussion and special provisions can be found in other supporting documentation, including congressional hearing records and all other documents relating to wilderness designation, which are available at the Complex office and incorporated by reference into this CCP/WSP.

B. The goals and objectives for the establishment of these wilderness areas, and their relationship to the refuge's purposes and Refuge System mission and goals, are summarized in Chapter 1, section 1.2. 1.6, and 1.7.

1.2. Description of the Wilderness Area.

A. The legal and narrative descriptions of the wilderness area are contained in chapter 3, section 3.3 (topography).

B. Maps displaying Service refuge boundaries, wilderness area boundaries, and other relevant legal, administrative, and natural boundaries are located within Chapter 1 (see Figures 1.1, 1.2, 1.3).

C. Descriptions of baseline wilderness resource conditions existing at the time of designation, including a description of the wilderness area, natural conditions, cultural resources and values, stewardship activities, existing facilities, and public use levels and activities are contained in the original San Juan Islands Wilderness Proposal document which is located at the refuge office. Current wilderness resource conditions are contained in Chapter 3 (Physical Environment), Chapter 4 (Refuge Biology and Habitat), and Chapter 5 (Human Environment).

1.3. Interagency and Tribal Coordination and Public Involvement. A description of coordination with States, other Federal agencies, and tribes, as well as a summary of public involvement activities, are contained in Chapter 1, section 1.12. Appendix K (not specific to wilderness) includes greater detail on agency, tribal, and public involvement, and Appendix L is a summary and analysis of comments received and how the plan responds to them.

1.4. Stewardship.

A. A description of stewardship strategies (administrative, natural and cultural resources, public recreation, interpretation and education, and commercial services) required to adequately administer the area can be found in Chapter 2, Goal 8.

B. Minimum requirement analyses (MRAs) and documentation of National Environmental Policy Act (NEPA) compliance for all refuge management activities and commercial services necessary to administer the area are found in this appendix**.**

C. Not Applicable: Descriptions of how we will manage existing private rights, existing rights-of-way, activities associated with valid mineral rights, and congressionally authorized uses to protect wilderness values.

D. Not Applicable: An explanation of how we will coordinate with adjoining wilderness units so that the wilderness character and natural and cultural resources and values are managed in a complementary manner that minimizes the impediments to visitors traveling from one wilderness area to another.

1.5. Research. Descriptions of past and current research are found in Chapter 5, and identification of research needs are discussed in Chapter 2, Goal 9. Other potential areas of research are mentioned throughout Chapter 4. Appropriateness Findings for Research are in Appendix I. Compatibility determinations for research, including wilderness-specific stipulations, are in Appendix J. An MRA for an activity directly related to a specific research project on San Juan Islands NWR is found in this appendix. All the aforementioned documents include discussion of relevant partnerships, funding, and staffing requirements, also included in a larger discussion within Appendix G.

1.6. Funds and Personnel. A discussion of staff and funds needed to administer the wilderness is included in Appendix G, Implementation**.**

1.7. Monitoring. To determine if we are meeting our wilderness stewardship objectives and other refuge management objectives in wilderness, a WSP is required to identify monitoring requirements; associated protocols; partnership, funding, and staffing needs; indicators of change in resource conditions; standards for measuring that change; and desired conditions or thresholds that will trigger management actions to reduce or prevent impacts on the wilderness. Monitoring requirements are listed in Chapter 2*; Goal 3 Objective 3.2; Goal 4 Objective 4.2; Goal 5 Objective 5.2; Goal 6 Objective 6.1, 6.3, 6.4; and Goal 8 Objective 8.2.* Specific details with regard to protocols, indicators of change, standards for measuring change, and desired conditions and thresholds triggering management actions will be detailed in a step-down Wilderness Monitoring plan following completion and approval of this CCP.

1.8. Implementation Schedule. A schedule of implementation, prioritization of action items, staff assignments, and funding requirements to adequately administer the area is contained in Appendix G, Implementation.

1.9. Appropriateness and Compatibility Determinations are found in Appendices I and J.

1.10. Review and Approval.

1.11. Appendix. All of the supporting documentation below (A. – F.) is available at the Complex office and incorporated by reference into this CCP:

A. A copy of the legislation establishing, modifying the boundary of, or making other changes to the wilderness areas. Relevant legislation is also summarized in Chapter 1, Section 1.6 and 1.7.

B. Wilderness study reports for San Juan Islands Wilderness.

C. Wilderness Proposal for San Juan Islands Wilderness (1971).

D. NEPA documentation for wilderness establishment.

E. Public hearing record from the wilderness study and record of review of comments received from States, other Federal agencies, tribes, and the public:

F. Congressional hearing record.

G. Congressional committee report accompanying the authorizing legislation.

H.2 Wilderness Review

2.1 Policy for Wilderness Reviews

A wilderness review is the process used to determine whether or not to recommend lands or waters in the National Wildlife Refuge System to Congress for designation as wilderness. The Service is required by policy to conduct a wilderness review for each refuge as part of the CCP process (Part 602 FW 3.4 C.(1)(c)). This review includes the re-evaluation of refuge lands existing during the initial 10-year review period of The Wilderness Act of 1964, as amended (16 U.S.C. 1131-1136), as well as new lands and waters added to the NWRS since 1974. NWRS policy on Wilderness Stewardship (610 FW 1-5) includes guidance for conducting wilderness reviews (610 FW 4 – Wilderness Review and Evaluation). Lands or waters that meet the minimum criteria for wilderness are identified in a CCP and further evaluated to determine whether they merit recommendation to the U.S. Congress for inclusion in the National Wilderness Preservation System (NWPS).

2.2 Criteria for Evaluating Lands for Possible Inclusion in the National Wilderness Preservation System

According to the Wilderness Act of 1964, as amended (16 USC 1131-1136), "An area of wilderness is further defined to mean in this Act an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding

opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least 5,000 acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value."

Criterion 3 is further defined in Section 3(c) of the Act as 1) a roadless area of 5,000 contiguous acres or more, or 2) a roadless island. Roadless is defined as the absence of improved roads suitable and maintained for public travel by means of 4-wheeled, motorized vehicles that are intended for highway use.

2.3 The Wilderness Review Process

A wilderness review is the process of determining whether the Service should recommend NWRS lands and waters to Congress for wilderness designation. The wilderness review process consists of three phases: wilderness inventory, wilderness study, and wilderness recommendation.

Wilderness Inventory
The inventory is a broad look at a refuge to identify lands and waters that meet the minimum criteria for wilderness - size, naturalness, and outstanding opportunities for solitude or primitive and unconfined type of recreation. All areas meeting the criteria are preliminarily classified as Wilderness Study Areas (WSAs). If WSAs are identified, the review proceeds to the study phase.

Wilderness Study
During the study phase, WSAs are further analyzed:

1) for all values: ecological, recreational, cultural, economic, symbolic
2) for all resources, including wildlife, vegetation, water, minerals, soils
3) for existing and proposed public uses
4) for existing and proposed refuge management activities within the area
5) to assess the refuge's ability to manage and maintain the wilderness character in perpetuity, given the current and proposed management activities. Factors for evaluation may include, but are not limited to, staffing and funding capabilities, increasing development and urbanization, public uses, and safety.

We evaluate at least an "All Wilderness Alternative" and a "No Wilderness Alternative" for each WSA to compare the benefits and impacts of managing the area as wilderness as opposed to managing the area under an alternate set of goals, objectives, and strategies that do not involve wilderness designation. We may also develop "Partial Wilderness Alternatives" that evaluate the benefits and impacts of managing portions of a WSA as wilderness.

In the alternatives, we evaluate:

1) the benefits and impacts to wilderness values and other resources
2) how each alternative will achieve the purposes of the Wilderness Act and the NWPS
3) how each alternative will affect achievement of refuge purpose(s) and the refuge's contribution toward achieving the Refuge System mission
4) how each alternative will affect maintaining and, where appropriate, restoring biological integrity, diversity, and environmental health at various landscape scales
5) other legal and policy mandates
6) whether a WSA can be effectively managed as wilderness by considering the effects of existing private rights, land status and service jurisdiction, refuge management activities and refuge uses and the need for or possibility of eliminating Sec 4 (c) prohibited uses

Wilderness Recommendation

If the wilderness study demonstrates that a WSA meets the requirements for inclusion in the National Wilderness Preservation System, a wilderness study report should be written that presents the results of the wilderness review, accompanied by a Legislative Environmental Impact Statement (LEIS). The wilderness study report and LEIS that support wilderness designation are then transmitted through the Secretary of the Interior to the President of the United States, and ultimately to the United States Congress for action. Refuge lands recommended for wilderness consideration by the wilderness study report will retain their WSA status and be managed as "… wilderness according to the management direction in the final CCP until Congress makes a decision on the area or we amended the CCP to modify or remove the wilderness recommendation" (610 FW 4.22B). When a WSA is revised or eliminated, or when there is a revision in "wilderness stewardship direction, we include appropriate interagency and tribal coordination, public involvement, and documentation of compliance with NEPA" (610 FW 3.13).

The following constitutes the inventory phase of the wilderness review for the Protection and San Juan Islands National Wildlife Refuges.

2.4 Previous Wilderness Reviews

A wilderness review was conducted for the San Juan Island refuges in 1971, and all were designated wilderness with the exception of Smith, Minor, Turn, and a small portion of Matia Islands. Protection Island has not previously been reviewed for wilderness.

2.5 Lands Considered Under This Wilderness Review

All Service-owned lands within the San Juan Islands and Protection Island (in fee title) National Wildlife Refuges not already within wilderness were considered during this wilderness review.

2.6 Wilderness Inventory

2.6.1 Unit Size: Roadless areas meet the size criteria if any one of the following standards apply:

- An area with over 5,000 contiguous acres solely in Service ownership.
- A roadless island of any size. A roadless island is defined as an area surrounded by permanent waters or an area that is markedly distinguished from the surrounding lands by topographical or ecological features.
- An area of less than 5,000 contiguous Federal acres that is of sufficient size as to make practicable its preservation and use in an unimpaired condition, and of a size suitable for wilderness management.
- An area of less than 5,000 contiguous Federal acres that is contiguous with a designated wilderness, recommended wilderness, or area under wilderness review by another Federal wilderness managing agency such as the Forest Service, National Park Service, or Bureau of Land Management.

Protection Island

Protection Island NWR is 364 acres and was established in 1982. It is located at the mouth of Discovery Bay in the Strait of Juan de Fuca. The island first described in the early 1790s by explorers has a varied

history beginning in the mid-1800s. That history includes farming, research, military, and urban development. The last included the construction of an air strip, roads, marina, and homes by the developers. Protection Island does not meet the roadless island requirements for an island wilderness area. The Service is required, by written agreement, to maintain these roads and other infrastructure that were built as part of the development for the extended users still allowed to use the island.

2.6.2 Naturalness and Wildness: the area generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable

This criterion must be evaluated in the context of current natural conditions and societal values and expectations without compromising the original intent of the Wilderness Act. It is well recognized that there are few areas remaining on the planet that could be truly classified as primeval or pristine, with even fewer, if any, existing in the conterminous United States. Likewise, few areas exist that do not exhibit some impact from anthropogenic influences, be it noise, light, or air pollution; water quality or hydrological manipulations; past and current land management practices; roads or trails; suppression of wildfires; invasions by non-native species of plants and animals; or public uses. While allowing for the near-complete pervasiveness of modern society on the landscape, the spirit of the Wilderness Act is to protect lands that still retain the wilderness qualities of being: 1) natural, 2) untrammeled, 3) undeveloped. These three qualities are cornerstones of wilderness character. For areas proposed or designated as wilderness, wilderness character must be monitored to determine baseline conditions and thereafter be periodically monitored to assess the condition of these wilderness qualities. Proposed and designated wilderness areas by law and policy are required to maintain wilderness character through management and/or restoration in perpetuity.

Defining the first two qualities (natural and untrammeled) requires a knowledge and understanding of the ecological systems which are being evaluated as potential wilderness. Ecological systems are comprised of three primary attributes – composition, structure, function. Composition is the components that make up an ecosystem, such as the habitat types, native species of plants and animals, and abiotic (physical and chemical) features. These contribute to the diversity of the area. Structure is the spatial arrangement of the components that contributes to the complexity of the area. Composition and structure are evaluated to determine the naturalness of the area. Function is the processes that result from the interaction of the various components both temporally and spatially, and the disturbance processes that shape the landscape. These processes include, but are not limited to, predator-prey relationships, insect and disease outbreaks, nutrient and water cycles, decomposition, fire, windstorms, flooding, and both general and cyclic weather patterns. Ecological functions are evaluated to determine the wildness or untrammeled quality of the area.

The third quality assessment is whether an area is undeveloped. Undeveloped refers to the absence of permanent structures such as roads, buildings, dams, fences, and other man-made alterations to the landscape. Exceptions can be made for historic structures or structures required for safety or health considerations, providing they are made of natural materials and relatively unobtrusive on the landscape.

General guidelines used for evaluating areas for wilderness potential during this wilderness inventory process include:

1. The area should provide a variety of habitat types and associated abiotic features, as well as a nearly complete complement of native plants and wildlife indicative of those habitat types. Non-native and invasive species should comprise a negligible portion of the landscape.

2. The area should be spatially complex (vertically and/or horizontally) and exhibit all levels of vegetation structure typical of the habitat type, have an interspersion of these habitats, and

provide avenues for plant and wildlife dispersal.

3. The area should retain the basic natural functions that define and shape the associated habitats including, but not limited to, flooding regimes, fire cycles, unaltered hydrology and flowage regimes, and basic predator-prey relationships, including herbivory patterns.

4. Due to their size, islands may not meet the habitat guidelines in 1 and 2 above. Islands should, however, exhibit the natural cover type with which they evolved and continue to be shaped and modified by natural processes. Islands should be further analyzed during the study portion of the review if they provide habitat for a significant portion of a population, or key life cycle requirements for any resources of concern or listed species.

5. Potential wilderness areas should be relatively free of permanent structures or man-made alterations. Areas may be elevated to the study phase if existing structures or alterations can be removed or remediated within a reasonable timeframe and prior to wilderness recommendation to the Secretary of the Interior.

Protection Island

Protection Island is 364 acres and was established in 1982. It is located at the mouth of Discovery Bay in the Strait of Juan de Fuca and is closed to the public to protect nesting sea birds and harbor seals. The island first described in the early 1790s by explorers has a varied history beginning in the mid-1800s. That history includes farming, research, military, and urban development. The last includes the construction of an air strip, roads, marina, and homes by the developers. Several of the former residences are occupied by the Service, a volunteer caretaker, and seasonal researchers under Special Use Permits. One lifetime private user still maintains a residence.

The island habitat is grassland/savanna, forest, and woodland. The shoreline habitat varies from sandy to rocky, and there remains a small remnant of brackish wetland. Much of the vegetative cover, particularly the grassland, is non-native and there is a great need for habitat restoration throughout the island. This restoration and all current maintenance require the use of mechanical equipment such as tractors, ATVs, and boats. The in-holding agreements cover various lengths of time. Some will expire in 2011, but one is a life-time use. The Service uses volunteers as resident caretakers, whose presence is critical to help protect the sensitive wildlife from human disturbance. Due to the greatly altered landscape, long-term human structures, extensive infrastructure, and legally required agreements to maintain this infrastructure requiring mechanical equipment, we have determined Protection Island does not satisfy minimum wilderness suitability criteria for 'naturalness and wildness' standards for wilderness designation.

The Service maintains all refuge islands in the San Juan Islands NWR as closed to the public with the exception of Matia and Turn Island.

Matia Island.

This unit of the refuge is 145 acres and was created in 1937. The entire island is already in wilderness designation with the exception of the 5-acre Rolf Cove campground area, which is owned by the Service but managed by the Washington State Parks and Recreation Commission (WSPRC) under a Memorandum of Understanding (MOU). The island habitat consists of grassland/savanna, herbaceous bald, forest and woodland, a small freshwater wetland, and shoreline that varies from sandy to rocky. Most of the island is dominated by native vegetation, but there is increasing non-native vegetative cover around the campsite areas. The campground offers six campsites, a floating dock, a sandy beach, one picnic site, and a compositing toilet. WSPRC maintains the toilet by removing the compost material with a small tractor. The entire island is closed to the public except for the campground area and the 1.2-mile

trail that loops through the wilderness area. There are no interpretative signs on this trail, but there are other permanent regulatory signs that are visible from the trail where it nears the outer edges of the island. Just off shore of the island and outside the jurisdiction of the Service, there is moorage for watercraft. Here, engine-driven electric generators are allowed, as well as other mechanical equipment. Considering there are permanent structures, mechanical equipment use, and permitted off-shore activities producing noise and light pollution that affect the wilderness experience, we have determined that this part of Matia island does not satisfy minimum wilderness suitability criteria for 'naturalness and wildness' standards for wilderness designation.

Turn Island.
This unit, owned by the Service, is 35 acres and is managed cooperatively with WSPRC under an MOU. The island habitat is grassland/savanna, forest and woodland, and shoreline habitat varies from sandy to rocky. There is year-round camping and boat moorage available for motorboats, and other watercraft are allowed to land on the island. There are permanent interpretative and regulatory signs along the .9-mile trail and island perimeter. The campground offers 13 campsites, a sandy beach, a picnic site, and two compositing toilets. WSPRC maintains the toilets by removing the compost material with a small tractor. Just off shore of the island and outside the jurisdiction of the Service, there is moorage for watercraft. Here, visitors can use engine-driven electric generators, as well as other mechanical equipment. This island is less than two miles from the town of Friday Harbor on San Juan Island and has the highest visitation of all the open refuge islands. The refuge proposes to increase the interpretation development of Turn Island to educate the public about the refuge, the National Wildlife Refuge System, and the many issues that threaten islands' habitats and wildlife. Because of the high use due to the proximity to Friday Harbor, permanent structures, the permitted use of power equipment just off-shore, and using power equipment on the island, we have determined Turn Island does not satisfy minimum wilderness suitability criteria for 'naturalness and wildness' standards for wilderness designation.

Smith and Minor Islands.
These units are 65 acres and were established in 1914 as an overlay to the U.S. Coast Guard's primary jurisdiction for aids to navigation. A lighthouse was built in 1857 on Smith Island, and the station was staffed from 1858 to the 1957, when it was abandoned due to erosion which threatened the structure. In the 1930s, Minor Island was used as a naval bombing area by the United States military with aircraft from nearby Whidby Island Naval Air Station. Smith Island habitat is grassland/savanna, forest and woodland, a small brackish wetland, and shoreline that varies from sandy to rocky. There are several permanent structures (residence, maintenance shop, cistern, and helicopter landing pad) built by the U.S. Coast Guard. Two towers (weather and communications) are also on the island and are serviced and maintained by USCG and NOAA using motorized equipment. Minor Island habitat is coastal sand strand and a concrete engine room and aids to navigation light are located there. Considering the past use of the islands and evidence of inadequate fuel storage (historic pictures), there is concern of possible soil contamination. Additionally, because of past military use as a bombing area, there is a concern regarding the potential for unexploded ordinance. These units do not meet the 'naturalness and wildness' standards for wilderness designation.

H.3 Minimum Requirement Analysis - Signs

San Juan Islands Wilderness Area

San Juan Islands NWR and Wilderness contain the majority of the seabird nesting colonies and pinniped haul-out sites in the Northern portion of the Salish Sea and the San Juan Archipelago. Black oystercatchers and pigeon guillemot nest along island shore lines. Pelagic, double-crested, and Brandt's cormorants, glaucous–winged and glaucous-winged/western gulls nest at more upland sites and bald

eagles nest in refuge trees. Steller and California sea lions haul-out on refuge islands and harbor seals use the islands for pupping and hauling-out. Elephant seals have recently used islands in the southern portion of the refuge to breed. The Washington Maritime NWR Complex proposes to install signs appropriate with management actions within the San Juan Islands Wilderness. There is a need to determine (1) if this action is necessary in wilderness and, (2) if so, what is the minimum required activity (tools and techniques).

Step 1: Determine if any administrative action is necessary.

Briefly describe the situation that may prompt action:

San Juan Islands NWR is a network of 83 islands, rocks, and reefs, and all are protected under the Wilderness Act with the following exceptions: Smith and Minor Islands, the Washington State Park-managed campground on Matia, and all of Turn Island. Additionally, all the islands are closed to the public due to the sensitive wildlife that utilizes these island habitats and safety concerns for approaching the islands. These islands are managed under the administration of the Washington Maritime NWR Complex.

The complex proposes to install closure information signs that are needed to keep the public off the closed islands for public safety and to protect wildlife. These signs will be compatible with the surroundings, and as small as possible as stated in 610 FW 2.5D(5). Since these signs are all along waterways they will also need to meet any Coast Guard or State requirements.

Management actions for this wilderness area include installation and maintenance of informational and interpretive signs at a variety of off-site locations adjacent to wilderness, such as Turn Island, a non-wilderness island within the refuge, trailhead to Matia Island wilderness trail, state parks, and marinas. On all the islands within the refuge, trespass is a serious and recurring problem, necessitating the placement of boundary and regulatory signs above the intertidal zone. Installation of these signs is necessary for informing the public which of the 172 islands in San Juan County are refuge islands, the sensitivity of these areas, and that they are closed to public access. These signs are located out of necessity just within the boundaries of the wilderness which begin on these islands at mean high tide.

To determine if administrative action is necessary, answer questions A-F.

A. Describe Options Outside of Wilderness

Is action necessary within wilderness? **Yes**

The management actions for these closed wilderness areas include placing signs and information about the refuge outside of the wilderness areas. This information will be located at public access points such as marinas, equipment rental facilities, watercraft education centers, and wildlife tour operator offices. There are limitations to the effectiveness of any management action. Therefore, this action is necessary within the wilderness since not all boaters read posted information; boaters coming to the refuge from other ports or launch locations that do not have this information, including international travelers; the signs act as a prevention against the threat of invasive species introductions; due to the marine conditions, jurisdictional ownerships, and topography of the islands it is not feasible to place the signs just outside the wilderness boundary.

B. Describe Valid Existing Rights or Special Provisions of Wilderness Legislation

Is action necessary to satisfy valid existing rights or a special provision in wilderness legislation (the Wilderness Act of 1964 or subsequent wilderness laws) that allows consideration of the Section 4(c) prohibited uses? **Yes**

Special Provision – from The Wilderness Act of 1964, as amended (16 U.S.C. 1131-1136) Section 4(b): "Except as otherwise provided in this Act, each agency administering any area designated as wilderness shall be responsible for preserving the wilderness character of the area and shall so administer such area for such other purposes for which it may have been established as also to preserve its wilderness character. Except as otherwise provided in this Act, wilderness areas shall be devoted to the public purposes of recreational, scenic, scientific, educational, conservation, and historical use."

Prohibited Uses – from The Wilderness Act of 1964, as amended (16 U.S.C. 1131-1136) Section 4(c): "Except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act (including measures required in emergencies involving the health and safety of persons within the area), there shall be no temporary road, no use of motor vehicles, motorized equipment or motorboats, no landing of aircraft, no other form of mechanical transport, and no structure (i.e., signs) as stated in 610 FW 2.5D(5) or installation within any such area."

C. Describe Requirements of Other Legislation

Is action necessary to meet the requirements of other laws? **Yes**

The National Wildlife Refuge System Administration Act of 1966, as amended, in section 4(a)(4)(B) directs the Service to (1) provide for the conservation of fish, wildlife, and plants, and their habitats within the NWRS; (2) ensure the biological integrity, diversity, and environmental health of the NWRS are maintained (see 610 FW 3); and (3) monitor the status and trends of fish, wildlife, and plants in each refuge. These requirements cannot be fully met through conducting research and monitoring actions outside the proposed wilderness area.

Executive Order 13112 directs federal agencies to: "subject to the availability of appropriations, and within Administration budgetary limits, use relevant programs and authorities to: (i) prevent the introduction of invasive species; (ii) detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner; (iii) monitor invasive species populations accurately and reliably; (iv) provide for restoration of native species and habitat conditions in ecosystems that have been invaded; (v) conduct research on invasive species and develop technologies to prevent introduction and provide for environmentally sound control of invasive species; and (vi) promote public education on invasive species and the means to address them".

D. Describe Other Guidance

Is action necessary to conform to direction contained in agency policy, unit and wilderness management plans, species recovery plans, or agreements with tribal, state and local governments or other federal agencies? **Not Applicable**

E. Wilderness Character

Is action necessary to preserve one or more of the qualities of wilderness character including untrammeled, undeveloped, natural, outstanding opportunities for solitude, or a primitive and unconfined type of recreation, or unique components that reflect the character of this wilderness area?

Untrammeled: Yes

San Juan Islands Wilderness resource values include supporting a great variety of sea bird species and important haulout areas for pinnipeds. The sea bird habitat includes areas for nesting and roosting, as well as migration stopover for many other bird species (San Juan Wilderness Proposal 1976). The vegetation habitat of the dry Douglas-fir and the dry prairie grasslands are becoming increasingly rare in the whole Salish Sea area due to development and other impacts such as invasive species (WDFW 2005). Protecting the untrammeled character of these wilderness areas requires protecting the flora and fauna that exist there during any season, and the ecological processes that support the native diversity. The threat of invasive species poses serious ecological harm, whether to the plant or animal community. Therefore, initiation of management actions to control, and where possible eliminate, trespassing would also reduce a secondary potential negative effect of invasive species introduction, which is critical to protecting these wilderness areas. On Matia Island there is a trail that loops through the wilderness part of the island right from the campground. Spur trails and human built structures have been built in the wilderness area by the public. This highlights the importance of the management need to place signs to better inform the public.

Undeveloped: Yes

The undeveloped islands, rocks, and reefs within the San Juan Islands Wilderness provide a dramatic natural setting within the San Juan archipelago. The area is a popular destination for visitor and residents to observe the varied and abundant wildlife. Many communities on the larger nearby islands have expanded services to accommodate the increased use of the area. Many of the refuge islands are short distances away from these developed areas which provide many points of access to view the refuge. Providing the public with refuge information and interpretive signage to encourage their participation in the protection of this valuable resource is of the utmost importance.

Natural: Yes

Many of the islands and rocks within the San Juan Islands Wilderness are located adjacent to inhabitated islands, an area receiving ever-increasing pressure for residential housing, commercial development and recreation. Efforts to minimize trespassing violations by using signs to inform the public of the wilderness ecological systems (plant and animal species and communities) are necessary to maintain the natural character of these islands. Because the "natural" quality also refers to the abundance, distribution, or number of invasive non-indigenous species, there is a need to protect these islands from invasive species.

Outstanding opportunities for solitude or a primitive and unconfined type of recreation: Not Applicable

Explain: All rocks, reefs, and islands within the San Juan Islands NWR, with the exception of the open camping areas on Matia and all of Turn Island, are closed to public entry to protect sensitive wildlife and habitat.

Other unique components that reflect the character of this wilderness: No

F. Describe Effects to the Public Purposes of Wilderness

Is action necessary to support one or more of the public purposes for wilderness (as stated in Section 4(b) of the Wilderness Act) of recreation, scenic, scientific, education, conservation, and historical use?

Recreation: **No**

All rocks, reefs, and islands within the San Juan Islands NWR, with the exception of the open camping and trail areas on Matia and all of Turn Island, are closed to public entry to protect sensitive wildlife and habitat.

Scenic: **Yes**

The control of trespassing and possible introduction of invasive species, and the subsequent preservation of seabird and pinniped colonies, will maintain the scenic value of the wilderness.

Scientific: **Not Applicable**

Education: **Yes**

Education about the sensitivity and the importance of undisturbed habitats within these wilderness areas is necessary for the continued protection of these island habitats. As residential and commercial development of the area continues to grow, it is important that the communities support the closed nature of the refuge. The educational information about the refuge needs to "open" the refuge to the public but from a distance. A win-win situation would be that the public understands and supports the refuge and that because of their efforts, there is greater abundance of wildlife for viewing in the area for everyone.

Conservation: Yes

These areas cannot be successfully conserved, including their wilderness values, without management actions within the wilderness areas. The Service cannot fully meet its affirmative responsibilities for refuge purposes, endangered and threatened species, invasive species, wilderness management objectives, and the NWRS mission without reducing trampling, protecting critical seabird and seal habitat, and controlling invasive species.

Historical use: No

Step 1 Decision: Is any administrative action necessary in wilderness? **Yes**

Explain: Although a large effort will be made to reach the public with information outside the wilderness area, there is still a large group of visitors to the area that would not be exposed to the educational efforts due to other points of entry. These additional entry points are private property, watercraft arriving from other areas in the state, or even internationally via Canada. The placement of signs on the islands would be kept to a minimum in numbers and size, but cannot be totally eliminated. These signs are needed to not only keep the public off the islands, but to maintain the 200-foot buffer around the islands. The buffer is to prevent the "take or harassment," under the Marine Mammal Protection Act of 1972 and the Endangered Species Act 1973, of pinniped haulout/pupping sites and other listed wildlife species. Although additional signage and information is planned outside the wilderness area, not all boaters would be exposed to that information. Therefore, to ensure that all trespassing and other potential violations are mitigated, signs are necessary. Safety is another reason to keep the public from approaching these islands, due to rocky shorelines, submerged hazards, currents, and other variables.

If action is necessary, proceed to Step 2 to determine the minimum activity.

Step 2: Determine the minimum activity/tools.

Description of Alternatives

For each alternative, describe what methods and techniques will be used, when the activity will take place, where the activity will take place, what mitigation measures are necessary, and the general effects to the wilderness resource and character.

Alternative # 1: No Management Activity
Under alternative #1, no management activity whatsoever is conducted in wilderness. Some expected results are described under Step 1 above.

Effects:

Wilderness Character

"Untrammeled" Repeated trespassing leading to trampling and introduction of invasive species would begin the degradation of the wilderness and increase the disturbance to the sensitive wildlife using the islands.

"Undeveloped" Maximized. There would be no further installation of signs, but the introduction of "homemade structures" being brought or built on the island would likely increase.

"Natural" Minimized. Invasive species continue to displace native species.

"Outstanding opportunities for solitude or a primitive and unconfined type of recreation"

Other unique components that reflect the character of this wilderness

Heritage and Cultural Resources N/A

Maintaining Traditional Skills N/A

Special Provisions N/A

Economic and Time Constraints N/A

Additional Wilderness-specific Comparison Criteria N/A

Safety of Visitors, Personnel, and Contractors N/A

Alternative # 2: No Generally Prohibited Uses

Description:

Sign Placement
Alternative #2, the placement of signs, is conducted in wilderness. Some expected results are described under Step 1 above.

Effects:

Wilderness Character

"Untrammeled" Maximized. Less trespassing would lead to reduced trampling and the risk of introduction of invasive species. There would also be a reduction of the disturbance to the sensitive wildlife using the islands.

"Undeveloped" Minimized. There would be a minimum installation of signs to inform the public about their responsibilities and the island's status, but the introduction of "homemade structures" being brought or built on the island could likely be eliminated.

"Natural" Maximized. With the public viewing from an approved distance, the invasion of non-native species could be eliminated from displacing native species.

"Outstanding opportunities for solitude or a primitive and unconfined type of recreation" Only Matia Island is open to the public; its wilderness areas and the limited number of signs placed in wilderness will not affect the solitude or primitive wilderness experiences of visitors.

Heritage and Cultural Resources N/A

Maintaining Traditional Skills N/A

Special Provisions N/A

Economic and Time Constraints N/A

Additional Wilderness-specific Comparison Criteria N/A

Safety of Visitors, Personnel, and Contractors N/A

Alternative # 3: Installation of Refuge Signs Utilizing Some Generally Prohibited Uses

Description:

A few generally prohibited uses may be necessary to facilitate installation of signs by the Service. In order to protect sensitive island habitat, minimize disturbance to wildlife, and for human safety purposes, it would be necessary to erect sign structures and the use of some motorized equipment (i.e., post hole auger, portable power supply, portable power tools, and chain saw) may be necessary.

Effects:

Wilderness Character

"Untrammeled" – Same as Alternative 2 plus: There is some wildlife disturbance associated with installation activities using power supplies and tools. The distance to wildlife and timing are carefully considered to minimize impacts to wildlife. Installation and routine maintenance by refuge staff will occur only a few days annually, resulting in negligible impacts to wilderness values.

"Undeveloped" – Same as Alternative 2 plus: Refuge signs will be limited in number and placed just within wilderness boundaries in an effort to minimize development impacts.

"Natural" – Same as Alternative 2 plus: These signs will result in a minimal negative effect to the wilderness viewshed.

"Outstanding opportunities for solitude or a primitive and unconfined type of recreation" – Only Matia Island is open to the public; its wilderness areas and the limited number of signs placed in wilderness will not affect the solitude or primitive wilderness experiences of visitors.

Heritage and Cultural Resources – N/A

Maintaining Traditional Skills – N/A

Special Provisions – N/A

Economic and Time Constraints – N/A

Additional Wilderness-specific Comparison Criteria – N/A

Safety of Visitors, Personnel, and Contractors – N/A

Step 2 Decision: What is the <u>Minimum</u> Activity?

Selected alternative:

The option selected is Alternative # 3.

<u>Rationale</u> for selecting this alternative (including documentation of safety criterion, if appropriate):

Installation of signs identifying refuge islands and informing the public that they are closed to public use (except for Matia Island) prevents human trespass and subsequent disturbance of seabirds and marine mammals. Use of power equipment will minimize staff presence on-site, thus reducing staff exposure to the volatility of the marine environment.

NEPA Compliance and Public Review: This MRA was prepared in association with the Protection Island and San Juan Islands National Wildlife Refuges Draft Comprehensive Conservation Plan; San Juan Islands Wilderness Plan; and associated Environmental Assessment (CCP/WSP/EA). It was made available for public review and comment at the same time as the Draft CCP/WSP/EA.

List any Wilderness Act Section 4(c) uses approved in this alternative:

1. temporary structure or installation (signs)
2. motorized equipment (chainsaw, generator, compressor)

Record and report any authorizations of Wilderness Act Section 4(c) uses according to agency procedures.

References:

Speich, S.M., and T.R. Wahl. 1989. Catalog of Washington seabird colonies. U.S. Fish and Wildlife Service, Service Biological Report 88(6). 510 pp.

USFWS (U.S. Fish and Wildlife Service). 2005a. Regional seabird conservation plan, Pacific Region. U.S. Fish and Wildlife Service, Migratory Bird and Habitat Programs. Pacific Region, Portland, OR. 261 pp.

H.4 Minimum Requirement Analysis – Research, Monitoring, and Management

San Juan Islands Wilderness Area

San Juan Islands NWR and Wilderness contain the majority of the seabird nesting colonies and pinniped haul-out sites in the northern portion of the Salish Sea and the San Juan Archipelago. Black oystercatchers and pigeon guillemot nest along island shore lines. Pelagic, double-crested, and Brandt's cormorants, glaucous–winged and glaucous-winged/western gulls nest at more upland sites and bald eagles nest in refuge trees. Steller and California sea lions haul-out on refuge islands and harbor seals use the islands for pupping and hauling-out. Elephant seals have recently used islands in the southern portion of the refuge to breed. The Washington Maritime NWR Complex proposes to conduct research, monitoring, and appropriate management actions within the San Juan Islands Wilderness. There is a need to determine (1) if this action is necessary in wilderness and, (2) if so, what is the minimum required activity (tools and techniques).

Research, monitoring, and management actions conducted by the Washington Maritime NWR Complex staff and their agents, including Washington Department of Fish and Wildlife, NOAA, universities and colleges, contribute to regional, national, and international conservation efforts for these marine-dependent species. Access to wilderness areas by Service employees or their agents is highly regulated and minimized. The refuge wilderness is closed to all public access (except for the wilderness trail on Matia Island) to protect sensitive wildlife from disturbance and to prevent trampling and destruction of habitats.

Research and monitoring programs that are not conducted by refuge staff or their designated agents are not covered under this Minimum Requirements Analysis (MRA). These non-Service activities will require separate analyses, once specific projects are proposed. Regulatory and informational signage is used for public use management. The construction and placement of wilderness signs is addressed in a separate MRA.

Step 1: Determine if any administrative action is <u>necessary.</u>

Briefly describe the situation that may prompt action:

Research and monitoring are essential to document the life-history requirements and needs of seabirds and pinnipeds, monitor population trends, determine anthropogenic and natural events that affect the populations, and develop appropriate management strategies and actions. Failure to conduct adequate

research and monitoring would leave refuge wildlife populations vulnerable to adverse impacts and undetected population declines that may be preventable or mitigated if detected sooner.

Research on refuge lands is inherently valuable to the Service because it expands scientific information available for resource management decisions. Scientific findings gained through these projects provide important information regarding life-history needs of species and species groups. Some research proposes to address wildlife conservation issues, such as understanding the causes of reduced or declining seabird and/or pinniped populations and addressing response of habitat/wildlife to disturbance from public uses adjacent to wilderness. Other research has broader applicability, such as using a suite of seabird species as indicators of ocean health conditions, and to document change in the larger marine environment and impacts associated with climate change and global warming. Projects may be species-specific or refuge-specific, or may evaluate the relative contribution of the refuge to larger landscape (e.g., ecoregion, region, flyway, national, and international) issues and trends.

The management strategy for San Juan Islands Wilderness is to allow natural processes to occur unimpaired by human actions except for the maintenance of the trail on Matia Island and treatment of invasive species. Maintenance would include the removal of any vegetation that impacts the use of the trail. Monitoring is crucial for early detection and development of management strategies to control these invasive species. Invasive mammals that reach the islands can quickly impact nesting birds, destroying whole seabird colonies. Invasive plants eliminate native vegetation, alter native flora communities, and can eliminate breeding habitat for burrow-nesting seabird species. Since seabirds, pinnipeds, and native plants are the primary natural resource components of the San Juan Islands Wilderness, declines or losses of populations would significantly reduce the wilderness character and result in the loss of wilderness public purposes including scientific, educational, and conservation. A rapid aggressive approach to the control or eradication of invasive species is necessary to maintain biological integrity and wilderness character.

To determine if administrative action is <u>necessary</u>, answer questions A-F.

B. Describe Options Outside of Wilderness

Is action necessary <u>within</u> wilderness? **<u>Yes</u>**

While much of the research and monitoring occurs physically outside of wilderness (e.g., from boats or aircraft), the subjects of the research and monitoring are within wilderness. The majority of the seabird nesting colonies and pinniped haul-out and pupping sites in Washington State marine waters are National Wildlife Refuge lands and wilderness. Opportunities to research or monitor these species outside wilderness are extremely limited; therefore, conducting this species-specific research on Service lands and within wilderness is essential. Currently, the Service allows pinniped research by NOAA, WDFW, and Cascadia Research Collective (under contract to both), through a Special Use Permit. This research includes monitoring of Steller sea lions and elephant seals, radio tagging harbor seals, tracking, and retrieval of shed tags, collection of samples for DNA and contaminant analysis, and necropsies. Radio receivers are used when tags are installed to ensure working condition and to locate shed tags.

Tools and temporary facilities that might be used to conduct research and monitoring include remote sensing equipment, blinds, temporary access equipment (i.e., ladder), weather station, solar array, telemetry equipment.

Detection and monitoring of harmful invasive or non-native plant and animal species is critical to accomplish both refuge and wilderness purposes, goals, and objectives. Although some methods of

detecting and monitoring these species (e.g., overflights, remote sensing) from outside the wilderness areas exist, these off-site methods may not yield the needed information in a timely or efficient manner. Invasive plant and animal control methods from outside wilderness exist (e.g., mechanical and aerial spraying, release of biological controls, quarantine protocols), but these methods may unnecessarily impact the wilderness area and other non-target habitats (e.g., pesticide drifting within wilderness and resulting death of target and non-target organisms), resulting in a loss of naturalness. The Service cannot meet its affirmative responsibilities under E.O. 13112 to monitor for, detect and rapidly control, or research invasive species solely from outside the wilderness area, nor can native ecosystems already impacted by invasive species be solely restored from outside the wilderness area.

B. Describe Valid Existing Rights or Special Provisions of Wilderness Legislation

Is action necessary to satisfy valid existing rights or a special provision in wilderness legislation (the Wilderness Act of 1964 or subsequent wilderness laws) that allows consideration of the Section 4(c) prohibited uses? **Yes**

Special Provision – from The Wilderness Act of 1964, as amended (16 U.S.C. 1131-1136) Section 4(b): "Except as otherwise provided in this Act, each agency administering any area designated as wilderness shall be responsible for preserving the wilderness character of the area and shall so administer such area for such other purposes for which it may have been established as also to preserve its wilderness character. Except as otherwise provided in this Act, wilderness areas shall be devoted to the public purposes of recreational, scenic, scientific, educational, conservation, and historical use."

Prohibited Uses – from The Wilderness Act of 1964, as amended (16 U.S.C. 1131-1136) Section 4(c): "Except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act (including measures required in emergencies involving the health and safety of persons within the area), there shall be no temporary road, no use of motor vehicles, motorized equipment or motorboats, no landing of aircraft, no other form of mechanical transport, and no structure or installation within any such area."

C. Describe Requirements of Other Legislation

Is action necessary to meet the requirements of other laws? **Yes**

The National Wildlife Refuge System Administration Act of 1966, as amended, in section 4(a)(4)(B) directs the Service to (1) provide for the conservation of fish, wildlife, and plants, and their habitats within the NWRS; (2) ensure the biological integrity, diversity, and environmental health of the NWRS are maintained (see 610 FW 3); and (3) monitor the status and trends of fish, wildlife, and plants in each refuge. These requirements cannot be fully met through conducting research and monitoring actions outside the proposed wilderness area.

Research is a specialized use (603 FW1) and, therefore, it is not considered a priority public use by NWRS policy. However, two provisions of the National Wildlife Refuge Improvement Act of 1997 are to "maintain biological integrity, diversity and environmental health" and to conduct "inventory and monitoring."

The Service and NOAA Fisheries, along with all other federal agencies, have affirmative responsibilities under the Endangered Species Act of 1973 to conserve endangered and threatened species at Section 2(c)(1). Federal agencies are also responsible for cooperating with the States to the maximum extent practicable in conserving listed species under Section 6(a). The Service currently authorizes NOAA and WDFW, acting as an agent of the Service and following the conditions of a Special Use Permit, to enter

the refuge wilderness area to conduct research on threatened Steller sea lions and non-listed harbor and elephant seals.

Executive Order 13112 directs federal agencies "subject to the availability of appropriations, and within Administration budgetary limits, use relevant programs and authorities to: (i) prevent the introduction of invasive species; (ii) detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner; (iii) monitor invasive species populations accurately and reliably; (iv) provide for restoration of native species and habitat conditions in ecosystems that have been invaded; (v) conduct research on invasive species and develop technologies to prevent introduction and provide for environmentally sound control of invasive species; and (vi) promote public education on invasive species and the means to address them."

D. Describe Other Guidance

Is action necessary to conform to direction contained in agency policy, unit and wilderness management plans, species recovery plans, or agreements with tribal, state and local governments or other federal agencies? **Yes**

Currently refuge staff are not actively conducting research, however, it is anticipated that in the next 15 years there would be additional seabird research related to the recently completed Pacific Region Seabird Conservation Plan (USFWS 2005a). The Service currently authorizes NOAA and WDFW, via a Special Use Permit, to enter the refuge wilderness area to conduct research on threatened Steller sea lions and non-listed harbor and elephant seals.

The Service's Research and Management Studies policy (4 RM 6) and Appropriate Refuge Uses policy (603 FW1.10D(4)) indicate priority for scientific investigatory studies that contribute to the enhancement, protection, use, preservation, and management of native wildlife populations and their habitat as well as their natural diversity. Projects that contribute to a specific refuge and/or wilderness management, where applicable, would be given a higher priority over other requests.

E. Wilderness Character

Is action necessary to preserve one or more of the qualities of wilderness character including untrammeled, undeveloped, natural, outstanding opportunities for solitude or a primitive and unconfined type of recreation, or unique components that reflect the character of this wilderness area?

Untrammeled: Yes

San Juan Islands Wilderness values include supporting nesting seabirds and bald eagles and hundreds of pinnipeds, and functioning as a botanical reserve for native plants. Protecting the untrammeled character of these wilderness areas requires protecting the flora and fauna found within them, and the ecological system in which these species and communities exist. Introduced plant species pose serious ecological problems, forming vast monospecific zones, lowering biodiversity, outcompeting native plants, and eliminating habitat for nesting seabird species. Mammalian predators have the potential for devastating impacts to nesting seabirds within San Juan Islands Wilderness. The Complex staff has concluded that maintenance of the untrammeled quality necessitates removal of selected plants and animals when it is determined that their presence is negatively impacting the wilderness ecological system and processes in a manner that will cause irreversible harm to the native species. Initiation of management actions to control, and where possible eliminate, invasive species requires monitoring to document infestations and evaluate success of control actions.

Undeveloped: Yes

The undeveloped refuge rocks, reefs, and islands within San Juan Islands Wilderness provide a dramatic natural setting in the San Juan Archipelago. Hundreds of thousands of annual visitors to the San Juan Archipelago appreciate the scenic natural beauty and the ecological values associated with the abundant marine wildlife populations these wilderness areas protect. All of San Juan Islands Wilderness is closed to public access (except for the wilderness trail on Matia Island) at all times to prevent disturbance to sensitive seabirds and pinnipeds and to prevent destruction of native plants and habitats.

In some cases, refuge management or research activities may require the use of temporary structures or equipment to prevent impacts to wildlife and habitat while conducting the activities. These actions have the potential to degrade the undeveloped quality because they involve generally prohibited uses; however, the desired information is essential and cannot be obtained from a location outside of wilderness, and the methods used are the minimum tools necessary to accomplish the objective safely and successfully. The impossibility of conducting the specific research or management activity by another means renders it necessary to utilize these tools to preserve the undeveloped quality of the wilderness areas.

Natural: Yes

Many of the rocks and islands within San Juan Islands Wilderness are located immediately adjacent to the larger islands in the Archipelago, an area receiving ever-increasing pressure for residential housing and commercial development. Monitoring the wilderness ecological systems (plant and animal species and communities) and evaluating impacts from internal and external forces is critical for attempting to maintain conditions substantially free from the effects of modern civilization. Because the "natural" quality also refers to the abundance, distribution, or number of invasive non-indigenous species, there is a need to monitor the natural quality of these wilderness areas with respect to invasive species, and develop management strategies to control them. Control of plant and animal invasive species, with the intent of manipulating habitats and correcting conditions resulting from human influence, is necessary to preserve the natural quality of these wilderness areas.

Outstanding opportunities for solitude or a primitive and unconfined type of recreation: Yes

Matia Island is open to the public via a State-operated public use site. A single trail system from this site allows the public to access a small part of the wilderness habitat. All the other rocks, reefs, and islands within the San Juan Islands Wilderness areas are closed to public entry to protect sensitive wildlife and habitat.

Other unique components that reflect the character of this wilderness: No

F. Describe Effects to the Public Purposes of Wilderness

Is action necessary to support one or more of the public purposes for wilderness (as stated in Section 4(b) of the Wilderness Act) of recreation, scenic, scientific, education, conservation, and historical use?

Recreation: Yes

Monitoring the impacts of public use at Matia Island will be needed to ensure that the area retains its wilderness character and values.

Scenic: **Yes**

Control of invasive plant and animal species and the subsequent preservation of seabird and pinniped colonies will maintain the scenic value of the wilderness.

Scientific: **Yes**

Scientific research is necessary to support management actions to protect wilderness values and achieve refuge purposes. Examples include studying health and life-history parameters of threatened Steller sea lions, development of non-intrusive survey methods for nesting seabirds, and study of best control methods for pest plants and animals. Research supplies necessary information to determine population status and trends for sensitive and listed species. Results of the research project will be published and shared with the scientific community.

Education: **Yes:**

Education about the sensitivity of the wildlife and habitats within these wilderness areas is necessary for their continued protection and to garner support to further their protection and management. For example, education about the effects of disturbance and invasive species on these wilderness resources, information gained through research and monitoring and encapsulated in regulatory and interpretive signage, may encourage the public to change their behaviors while visiting the Archipelago and cause them to be less likely to trespass on rocks and islands. The results of research projects will be incorporated into the Complex's environmental education and interpretation program.

Conservation: Yes

This area cannot be successfully conserved, including its wilderness values, without administrative action within the wilderness area. The Service cannot fully meet its affirmative responsibilities for endangered and threatened species, invasive species, refuge purposes, wilderness management objectives, and the NWRS mission without monitoring impacts of research, controlling invasive species to reduce trampling, and assisting in endangered species recovery to recover naturalness.

Historical use: No

Step 1 Decision: Is any administrative action necessary in wilderness? **Yes**

Research, monitoring, and management of vulnerable refuge wildlife and habitats are actions necessary to achieve and document progress towards fulfillment of the purposes of these refuges as ". . . a preserve and breeding ground for native birds and animals"; ". . . as a refuge and breeding ground for wild birds and animals"; to maintain the wilderness wildlife values on the refuges; and to help fulfill the mission of the National Wildlife Refuge System.

If action is necessary, proceed to Step 2 to determine the minimum activity.

Step 2: Determine the minimum activity/tools.

Description of Alternatives

For each alternative, describe what methods and techniques will be used, when the activity will take place, where the activity will take place, what mitigation measures are necessary, and the general effects to the wilderness resource and character.

Alternative # 1: No Management Activity
Under alternative #,1 no management activity whatsoever is conducted in wilderness. Some expected results are described under Step 1 above.

Alternative # 2: No Generally Prohibited Uses

Description:

Research, Monitoring, and Management
Alternative #2 would involve the elimination of low level aerial surveys, and temporary facilities and equipment used for research and monitoring.

Effects:

Wilderness Character

"Untrammeled"– Minimal human manipulation. Many rocks and islands are difficult to access for monitoring and invasive species control. Without access and management to control invasive species, the unchecked increase in invasives is likely to negatively impact the wilderness ecological system and processes in a manner that will cause irreversible harm to the native species.

"Undeveloped" – Minimized. There would be no temporary placement of facilities or motorized or mechanical equipment. The ability of the Service to conduct research, monitoring, and management activities would be greatly diminished through reduction of tools (i.e., remote sensing equipment, blinds, temporary access equipment (i.e., ladder), weather station, and telemetry equipment).

"Natural" – Minimized. Wildlife disturbance from Service activities would be less than in Alternative #3. The ability of the Service to conduct research, monitoring, and management activities would be diminished, threatening the integrity and biological diversity of the refuges. Information gathered would be limited and the ability to effectively monitor and document seabird and pinniped population trends would be compromised. Undetected wildlife population declines and the subsequent failure to reverse those declines would negatively impact the wildlife and other values of the refuge wilderness areas.

"Outstanding opportunities for solitude or a primitive and unconfined type of recreation" – Matia Island retains its current public use trail. All other areas remain closed to public entry.

Heritage and Cultural Resources – N/A

Maintaining Traditional Skills - N/A

Special Provisions – N/A

Economic and Time Constraints – N/A

Additional Wilderness-specific Comparison Criteria – N/A

Safety of Visitors, Personnel, and Contractors – N/A

Alternative # 3: Research, Monitoring, and Management Utilizing Some Generally Prohibited Uses

Description:

Research
Refuge Complex staff is not currently conducting independent research within the refuge wilderness areas, primarily due to limited staff and funding. It is anticipated that in the next 15 years increases in staff and funding will allow refuge staff to conduct important research projects on the highest priority species and issues. Research being conducted by refuge agents includes threatened Steller sea lions and other pinniped studies by NOAA Fisheries and WDFW, and black oystercatcher research led by WDFW. These research projects are controlled through Special Use Permits that contain various restrictions and stipulations to ensure that impacts to wildlife and habitats are kept to a minimum. The following is a set of criteria that will be used, in part, to determine if research will be permitted to occur within refuge wilderness areas.

Research Criteria:
- Research that focuses on conservation, management, and protection of refuge species of concern such as seabirds and pinnipeds, control or eradication of invasive plants and animals, and research that provides an understanding of island ecology, ecosystem function, and climate change impacts.
- Research will be conducted by Service employees or their agents.
- Prohibited uses, per Section 4(c) of the Wilderness Act, will not occur unless they are necessary to meet minimum requirements for the administration of these areas.
- Disturbance to wildlife will be minimized and not adversely affect populations.

The Refuge Manager occasionally receives requests from universities and others to conduct additional research within the refuge wilderness areas. Each of these situations is considered on a case-by-case basis and is evaluated to determine expected benefits of the research to knowledge and/or management of refuge flora and fauna, as well as possible impacts to the resources, habitats, and wilderness character resulting from research activities. This type of research is covered under a Compatibility Determination (see Appendix J) and prospective non- Service researchers will be required to prepare a separate MRA for proposed activities within the wilderness areas. The Wilderness Act does not allow outside researchers and others who are not direct agents of the Service to gain exemptions to the prohibited uses provisions (Section 4(c) of the Act).

Several generally prohibited uses may be necessary to facilitate critical research being conducted by agents of the Service. In order to protect sensitive island habitat, minimize disturbance to wildlife, and for human safety purposes, it may occasionally be necessary to erect temporary unobtrusive structures such as a blinds, remote sensing and monitoring equipment, etc., and use of chainsaws and power augers may be necessary.

Monitoring
Monitoring is conducted by refuge staff and refuge agents in order to determine wildlife population status and trends; document wildlife disturbances; document the occurrences of invasive species; and evaluate the results of control actions. Most monitoring occurs from off-refuge and outside of the wilderness area from boats. This is done to minimize disturbance to wildlife and to the wilderness area. Seabird and pinniped trend surveys are conducted using fixed-wing and rotary-winged aircraft generally at an altitude of 1,000 feet or more, but occasionally as low as 500 feet one to three times a year. On some occasions,

refuge staff and agents will enter the refuge wilderness area to obtain data on seabirds, pinnipeds, and other wildlife and/or survey for invasive species. The wilderness rocks, reefs, and islands are accessed from small boats at sea. At some locations, effective monitoring can require utilization of several generally prohibited uses including construction of temporary unobtrusive structures such as a boardwalk or remote video monitoring system. Use of some motorized equipment such as chainsaws and power augers may be necessary.

In all cases the minimum activity and tools will be used to accomplish the work in fulfilling the purposes of the refuge and to protect the wilderness character and value. Currently, only a minimum amount of monitoring is being conducted by the refuge due to limited staff and funding. It is anticipated that within 15 years of the completion of the Comprehensive Conservation Plan, increases in staff and funding will allow the refuge to initiate and maintain important seabird monitoring projects in accordance with the Regional Seabird Conservation Plan (USFWS 2005a) and monitoring of the highest priority species.

Management
The management strategy for San Juan Islands Wilderness is to allow natural processes to occur unimpaired by human actions. The exception to this management strategy is the treatment of invasive species. Refuge staff and agents will conduct a rapid and aggressive approach to control or eradicate invasive plants and animals. Invasive mammals can quickly eliminate entire colonies of nesting seabirds. Invasive plants eliminate native vegetation and can alter native flora communities. The spread of some invasive plants such as ice plant (*Carpobrotus chilensis*) can eliminate breeding habitat for burrow-nesting seabird species.

Invasive plant and non-native predator control or eradication will be accomplished using integrated pest management techniques. Control of native mammalian predators will be undertaken according to a yet to be developed step-down management plan. No generally prohibited tools will be used to control invasive species within these wilderness areas. Chainsaws maybe used to maintain the trail on Matia Island.

Effects:

Wilderness Character

"Untrammeled" – There is some wildlife disturbance associated with permitted research and monitoring activities and occasional unauthorized public entry into the wilderness. The distance to wildlife, timing, and frequency of efforts are all carefully considered to minimize impacts to wildlife while maximizing the data obtained.

"Undeveloped" – The majority of the monitoring is conducted with the observers located outside of the wilderness area viewing from small boats. During the infrequent visits to some of the rocks and islands in the wilderness area for monitoring and/or research purposes, wildlife disturbance is minimized, sensitive habitats are protected, and no permanent structures or equipment are erected. In a very limited number of cases it may be necessary to erect temporary facilities and equipment such as blinds to prevent disturbance of seabird nesting habitat during research activities or to install remote sensing equipment. Used and temporary facilities will minimize impacts to the refuge and to the wildlife, protect wilderness character, and leave no trace once removed. Temporary facilities and equipment will be installed prior to the breeding season or research project and removed immediately after the breeding season or completion of the research project.

"Natural" – Minimized. Wildlife disturbance from Service activities would be slightly greater than in Alternative #2. The ability of the Service to conduct research, monitoring, and management activities

would be enhanced. Seabird, pinniped, and invasive species population trends would be more accurately tracked. Development of management options to reverse declining wildlife populations or increasing invasive species populations would be developed, thus maintaining the natural quality.

"Outstanding opportunities for solitude or a primitive and unconfined type of recreation" – The rocks, reefs, and islands of the San Juan Islands wilderness area are not open to the public except for a 1.2 mile wilderness trail on Matia Island. However, they are extremely important to the recreational experiences of Archipelago residents and visitors who view these areas from boats or Washington State ferries. Because the duration and frequency of research, monitoring, and management efforts are limited, and because most of the refuge and associated wilderness area are closed to public use, the impacts to solitude are negligible.

Heritage and Cultural Resources – N/A

Maintaining Traditional Skills – N/A

Special Provisions – N/A

Economic and Time Constraints – N/A

Additional Wilderness-specific Comparison Criteria – N/A

Safety of Visitors, Personnel, and Contractors – N/A

Step 2 Decision: What is the <u>Minimum</u> Activity?

Selected alternative:

The option selected is Alternative # 3.

<u>Rationale</u> for selecting this alternative (including documentation of safety criterion, if appropriate):

Research, monitoring, and management of the refuge wilderness rocks, reefs, and islands require occasionally accessing these areas approximately ten times per year. Access is from small boats at sea. Observations conducted from the water in motorized boats outside of the wilderness areas, infrequent aerial surveys above the wilderness, and erection of unobtrusive temporary structures and equipment are essential tools needed to conduct research, monitoring, and management activities in support of the refuges. The minor amount of wildlife disturbance caused by research, monitoring, and management is minimal compared to the importance of collecting data that directly contributes to species conservation. If conducted only when absolutely necessary, these activities are all considered the minimum tools needed to accomplish refuge purposes including wilderness values. They preserve wilderness character and only minimally impact human solitude while benefiting the wildlife values of the wilderness.

NEPA Compliance and Public Review: This MRA was prepared in association with the Protection Island and San Juan Islands National Wildlife Refuges Draft Comprehensive Conservation Plan; San Juan Islands Wilderness Plan; and associated Environmental Assessment (CCP/WSP/EA). It was made available for public review and comment at the same time as the Draft CCP/WSP/EA.

List any Wilderness Act Section 4(c) uses approved in this alternative:

3. temporary structure or installation (blinds, weather station, ladders, remote sensing equipment and solar array)
4. motorized equipment (chainsaw and power auger)

Record and report any authorizations of Wilderness Act Section 4(c) uses according to agency procedures.

References:

National Marine Fisheries Service. 2008. Recovery plan for the Steller sea lion (*Eumetopias jubatus*). Revision. National Marine Fisheries Service. Silver Spring, MD. 325 pp.

Speich, S.M., and T.R. Wahl. 1989. Catalog of Washington seabird colonies. U.S. Fish and Wildlife Service, Service Biological Report 88(6). 510 pp.

USFWS (U.S. Fish and Wildlife Service). 2005a. Regional seabird conservation plan, Pacific Region. U.S. Fish and Wildlife Service, Migratory Bird and Habitat Programs. Pacific Region, Portland, OR. 261 pp.

Appendix I. Appropriateness Findings

I. Introduction

Under the Appropriate Refuge Uses Policy, 603 FW 1, (2006) refuge managers are directed to determine if a new or existing public use is an appropriate refuge use. If an existing use is not appropriate, the refuge manager is directed to modify the use to make it appropriate or terminate it, as expeditiously as practicable. If a new use is not appropriate, the refuge manager will deny the use without determining compatibility. If a use is determined to be appropriate, then a compatibility determination should be developed to determine whether the use can be allowed.

An "appropriate use" must meet at least one of the following three conditions:

- The use is a wildlife-dependent recreational use as identified in the Refuge Improvement Act.
- The use involves the take of fish and wildlife under State regulations.
- The use has been found to be appropriate as specified in section 1.11 of the policy and documented on FWS Form 3-2319.

During the CCP process, the refuge manager reviewed all existing and proposed refuge uses for the refuge. Documentation of appropriateness findings for wildlife-dependent uses is not included in this Appendix because wildlife-dependent uses are appropriate by definition. They are, however, evaluated for compatibility in the following Appendix J. All other refuge uses were evaluated using the criteria described in policy and listed on FWS Form 3-2319. The table below shows the uses evaluated and appropriateness findings made by the refuge manager. Additional documentation is included in this appendix for each use identified in the table.

Refuge	Refuge Use	Appropriate	Page
Protection Island	Research	Yes	I-2
San Juan Islands	Research	Yes	I-4
San Juan Islands	Camping	Yes	I-6
San Juan Islands	Pets	No	I-8

Finding of Appropriateness of a Refuge Use

Refuge Name: **Protection Island**

Use: **Research**

This exhibit is not required for wildlife-dependent recreational uses, forms of take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D. for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will generally not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ____ No _✓__

When the refuge manager finds the use **appropriate** based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ Appropriate__✓

Refuge Manager: _____ Date: 9/27/2010

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: _____ Date: 9/27/2010

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319 02/06

Finding of Appropriateness of a Refuge Use: Attachment

Refuge Name: **Protection Island**

Use: **Research**

Supplemental Information

Description of Use:

The Washington Maritime NWR Complex receives periodic requests from non-Service entities (e.g., universities, state agencies, other federal agencies, NGOs) to conduct research, scientific collecting, and surveys on Protection Island NWR. The Refuge Manager currently has the authority to issue research permits. (603 FW1)

Projects can involve a broad range of natural resource issues including habitat use and life-history requirements for specific species/species groups, practical methods for habitat restoration, extent and severity of environmental contaminants, techniques to control or eradicate pest species, effects of climate change on environmental conditions and associated habitat/wildlife response, modeling of wildlife populations, and assessing response of habitat/wildlife to disturbance. Projects may be species-specific, refuge-specific, or evaluate the relative contribution of the refuge to larger landscape (e.g., ecoregion, region, flyway, national, international) issues and trends. The Service's Research and Management Studies (4 RM 6) and Appropriate Refuge Uses policies (603 FW1.10D(4)) indicate priority for scientific investigatory studies that contribute to the enhancement, protection, use, preservation, and management of native wildlife populations and their habitats as well as their natural diversity.

Facilities supporting research on Protection Island NWR include a 468-square-foot refuge office, 768-square-foot research station/bunkhouse, 120-square-foot research storage/shop building, marina, and 2 floating piers. In addition there is a 140-foot well, a 33,000-gallon water tower, and a 10,200-cubic-foot water distribution system.

Justification:

(c) Is the use consistent with applicable Executive Orders and Department and Service policies?

Research is consistent with Service policy. Protections Island's refuge founding purpose includes the following provision; "... to provide for scientific research..." In addition, two provisions of the National Wildlife Refuge Improvement Act of 1997 directly support research within the refuge to "maintain biological integrity, diversity and environmental health" and to conduct "inventory and monitoring."

(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?

Research not only serves to further the user's knowledge and understanding of Protection Island NWR, it also aids in managing refuge resources. Seabird and pinniped conservation and management within the refuge are based upon best available scientific information from research combined with long-term monitoring. Some research is used to address specific wildlife conservation questions, such as understanding the causes of reduced or declining seabird and/or pinniped populations. Other research has broader applicability, such as using a suite of seabird species as indicators of ocean health conditions, and to document change in the larger marine environment and associated impacts associated with climate change and global warming.

Finding of Appropriateness of a Refuge Use

Refuge Name: **San Juan Islands NWR**

Use: **Research**

This exhibit is not required for wildlife-dependent recreational uses, forms of take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D. for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will generally not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ____ No ✓

When the refuge manager finds the use **appropriate** based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ Appropriate ✓

Refuge Manager: _____ Date: 9/27/2010

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: _____ Date: 9/27/2010

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319 02/06

Finding of Appropriateness of a Refuge Use: Attachment

Refuge Name: **San Juan Islands**

Use: **Research**

Supplemental Information

Description of Use:

The Washington Maritime NWR Complex receives periodic requests from non-Service entities (e.g., universities, state agencies, other federal agencies, NGOs) to conduct research, scientific collecting, and surveys on refuge lands within the San Juan Islands NWR. The Refuge Manager currently has the authority to issue research permits (603 FW1).

Projects can involve a wide range of natural and cultural resources, as well as public-use management issues including habitat use and life-history requirements for specific species/species groups, practical methods for habitat restoration, extent and severity of environmental contaminants, techniques to control or eradicate pest species, effects of climate change on environmental conditions and associated habitat/wildlife response, identification and analyses of paleontological specimens, wilderness character, modeling of wildlife populations, and assessing response of habitat/wildlife to disturbance from public uses. Projects may be species-specific, Refuge-specific, or evaluate the relative contribution of the refuge to larger landscape (e.g., ecoregion, region, flyway, national, international) issues and trends. The Service's Research and Management Studies (4 RM 6) and Appropriate Refuge Uses policies (603 FW1.10D(4)) indicate priority for scientific investigatory studies that contribute to the enhancement, protection, use, preservation, and management of native wildlife populations and their habitats as well as their natural diversity.

Justification:

(c) Is the use consistent with applicable Executive Orders and Department and Service policies?

Research is consistent with Service policy. Two provisions of the National Wildlife Refuge Improvement Act of 1997 are to "maintain biological integrity, diversity and environmental health" and to conduct "inventory and monitoring." These provisions support refuge research.

(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?

Research not only serves to further the user's knowledge and understanding of the refuge, it also aids in managing refuge resources. Wildlife and habitat conservation and management within the refuge are based upon best available scientific information from research combined with long-term monitoring. Some research is used to address specific wildlife conservation questions, such as understanding the causes of reduced or declining seabird and/or pinniped populations and development of tools and techniques to aid recovery of threatened or endangered species. Other research has broader applicability, such as using a suite of seabird species as indicators of ocean health conditions, and to document change in the larger marine environment, and impacts associated with climate change and global warming.

Finding of Appropriateness of a Refuge Use

Refuge Name: **San Juan Islands NWR**

Use: **Camping**

This exhibit is not required for wildlife-dependent recreational uses, forms of take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D. for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will generally not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ____ No _✓_

When the refuge manager finds the use **appropriate** based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ Appropriate__✓___

Refuge Manager: _____ Date: 9/27/2010

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: _____ Date: 9/27/2010

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319 02/06

Finding of Appropriateness of a Refuge Use: Attachment

Refuge Name: **San Juan Islands NWR**

Use: **Camping**

Supplemental Information

Description of Use:

Currently Matia Island has 6 primitive campsites and Turn Island has 13. All camping-related facilities are managed by the Washington State Parks and Recreation Commission. Under the management of the CCP, Matia would maintain all 6 sites and Turn would have 8 sites.

Camping would be allowed only by persons arriving by non-motorized (human-powered) vessels. Refuge personnel will monitor camp site use and should they find non-compliance in numbers of campers per site, camping in unauthorized locations, or camp site use resulting in unacceptable adverse effects to refuge resources, additional camp site modifications, including a camp site reservation system, may be necessary in order to continue to allow camping to occur on these islands.. Pets and open fires would be prohibited on both islands, however, visitors could continue to use liquid fuel camp stoves. Through an agreement with the Service, the State Parks and Recreation Commission would continue to manage the camping program including collecting fees.

Justification:

(d) Is the use consistent with public safety?

Due to their remote locations, visitors who travel to these refuge islands by human-powered craft may be afforded safe refuge to rest, and to allow wind, currents, and inclement weather to abate. Because such vessels travel slower than motor-powered vessels and have other mobility constraints, these visitors require more time to reach these refuge units, particularly Matia Island. Without the ability to camp overnight, such visitors may simply not have enough time to reach the islands and then safely reach another location before sunset. Thus, these camping sites must be maintained in order to provide this recreational opportunity while protecting public safety.

(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?

Camping affords visitors a unique opportunity to experience wildlife at times when animals are particularly active, such as dawn and dusk, and to listen to the sounds of wildlife at night. Such experiences support the priority public uses of wildlife observation, photography, and environmental education, and foster a greater appreciation and understanding of the refuge's wildlife resources. For example, due to its centralized location, Turn Island is an ideally suited staging area for multi-day human-powered vessel excursions throughout the San Juan Archipelago. Such events promote wildlife-dependant recreation throughout the geographically separated refuge units, fostering a greater understanding and appreciation of refuge resources. Motorized vessels, on the other hand, do not have the same travel limitations and have other nearby camping opportunities. The opportunity to engage in several priority public uses provided through this type of camping experience would outweigh any anticipated negative impacts associated with offering this experience.

Finding of Appropriateness of a Refuge Use

Refuge Name: **San Juan Islands NWR**

Use: **Pets**

This exhibit is not required for wildlife-dependent recreational uses, forms of take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?		✓
(c) Is the use consistent with applicable Executive orders and Department and Service policies?		✓
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?		✓
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D. for description), compatible, wildlife-dependent recreation into the future?		✓

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will generally not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ____ No ✓

When the refuge manager finds the use **appropriate** based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate ✓ Appropriate ____

Refuge Manager: _____ Date: 9/27/2010

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: _____ Date: 9/27/2010

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319 02/06

Finding of Appropriateness of a Refuge Use: Attachment

Refuge Name: **San Juan Islands NWR**

Use: **Pets**

Supplemental Information

Description of Use:
Currently pets are allowed on leashes in the campground areas on both Matia and Turn Islands. However, visitors sometimes allow pets to run free in the campgrounds and in areas that are off limits to domestic animals.

Allowing pets to enter refuge units in the San Juan Islands has been determined not to be appropriate.

Justification:

(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?
(c) Is the use consistent with applicable Executive orders and Department and Service policies?

The use does not comply with Federal regulations and is inconsistent with Service policy. The presence of pets directly results in an absence of wildlife and is at odds with the establishing purpose of the refuge. In addition, allowing pets to enter and roam within a National Wildlife Refuge is a violation of 50 CFR 26.21 (b).

(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?

The use cannot be accommodated without negatively impacting wildlife and impairing or eliminating wildlife viewing opportunities. Studies indicate that wildlife exhibit a greater response from disturbance by dogs than from disturbance by pedestrians (MacArthur et al. 1982; Hoopes 1993). In the case of birds, the presence of dogs may flush incubating birds from nests (Yalden and Yalden 1990), disrupt breeding displays (Baydack 1986), disrupt foraging activity in shorebirds (Hoopes 1993), and disturb roosting activity in ducks (Keller 1991). Many of these authors indicated that dogs with people, dogs on-leash, or loose dogs provoked the most pronounced disturbance reactions from their study animals.

Baydack, R. K. 1986. Sharp-tailed grouse response to lek disturbance in the Carberry Sand Hills of Manitoba. Colorado State University, Fort Collins, Colorado

Hoopes, E. M.1993. Relationships between human recreation and piping plover foraging ecology and chick survival. Thesis, University of Massachusetts, Amherst, Massachusetts

Keller, V. 1991 Effects of human disturbance on eider ducklings *Somateria mollissima* in estuarine habitat in Scotland. Biological Conservation 58: 213-228

MacArthur, R. A., V. Geist, R. H. Johnston. 1982. Cardiac and behavioral responses of mountain sheep to human disturbance. Journal of Wildlife Management 46: 351-358

Yalden, P. E., and D. W. Yalden. 1990. Recreational disturbance of breeding golden plovers *Pluvialus apricarius.* Biol. Conserve. 51: 243-262

Appendix J. Compatibility Determinations

J. Introduction

Compatibility is a tool refuge managers use to ensure that recreational and other uses do not interfere with wildlife conservation - the primary focus of refuges. Under the Compatibility Policy 603 FW 2 (2000), refuge managers are directed to determine if a proposed or existing refuge use is compatible with refuge purposes and the National Wildlife Refuge System mission. Refuge uses are defined as recreational or economic/commercial or management use of the refuge by the public or a non-Refuge System entity. The Service does not, however, prepare compatibility determinations for uses when the Service does not have jurisdiction. Compatibility determinations are required to be in writing and the public should have an opportunity to comment on them.

The Service recognizes that compatibility determinations are complex. For this reason, refuge managers are required to consider principles of sound fish and wildlife management and best available science in making these determinations. If an existing use is not compatible, the refuge manager is directed to modify the use to make it compatible or terminate it, as expeditiously as practicable.

In July 2006, the Service published its Appropriate Refuge Uses Policy (603 FW1). Under this policy, most proposed uses must also undergo an appropriateness review prior to compatibility. If a proposed use is not appropriate, the refuge manager will deny the use without determining compatibility. Priority wildlife-dependent activities are automatically considered appropriate. If a use is determined to be appropriate, then a compatibility determination is developed to determine whether the use can be allowed. Appropriateness findings for Protection Island and San Juan Islands Refuges can be found in Appendix I.

Compatibility Determinations evaluated at this time

This set of compatibility determinations (CDs) evaluates uses projected to occur under the Comprehensive Conservation Plan and Wilderness Stewardship Plan for Protection Island and San Juan Islands Refuges (CCP/WSP). The evaluation of funds needed for management and implementation of each use also assumes implementation as described under the plan. Compatibility determinations are based on the professional judgment of refuge personnel, including observations of existing refuge uses.

Compatibility Determination

Use: Research, Scientific Collecting, and Survey Activities

Refuge Name: Protection Island National Wildlife Refuge

Refuge Purposes and Establishing/Acquisition Authorities

> *"The purposes of the refuge are to provide habitat for a broad diversity of bird species, with particular emphasis on protecting the nesting habitat of the bald eagle, tufted puffin, rhinoceros auklet, pigeon guillemot, and pelagic cormorant; to protect the hauling-out area of harbor seals; and to provide for scientific research and wildlife-oriented public education and interpretation"* (All lands, Protection Island National Wildlife Refuge Act, Public Law 977-333, Oct 15, 1982, 96 Stat. 1623).
>
> *". . . for the development, advancement, management, conservation, and protection of fish and wildlife resources . . ."* (340 acres under tideland lease, 16 U.S.C.742 f(a)(4), Fish and Wildlife Act of 1956)

National Wildlife Refuge System Mission

"The mission of the System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee]).

Description of Use

The Washington Maritime National Wildlife Refuge Complex (Complex) receives periodic requests from non-Service entities (e.g., universities, state agencies, other federal agencies, NGOs) to conduct research, scientific collecting, and surveys on Protection Island. These projects can involve a wide range of natural and cultural resources, as well as public-use management issues, including habitat use and life-history requirements for specific species/species groups, practical methods for habitat restoration, extent and severity of environmental contaminants, techniques to control or eradicate pest species, effects of climate change on environmental conditions and associated habitat/wildlife response, identification and analyses of paleontological specimens, wilderness character, modeling of wildlife populations, and assessing response of habitat/wildlife to disturbance from public uses. Projects may be species-specific, refuge-specific, or evaluate the relative contribution of the refuge to larger landscape (e.g., ecoregion, region, flyway, national, international) issues and trends.

Facilities supporting research on Protection Island NWR include a 468-square-foot refuge field office, 768-square-foot research station/bunkhouse, 120-square-foot research storage/shop building, marina and 2 floating piers. In addition, there is a 140-foot well, a 33,000-gallon water tower, and a 10,200-cubic-foot water distribution system. All of the above mentioned facilities except for the research station/bunkhouse and shop/storage support additional uses other than research. Replacement and relocation of the refuge office, research station/bunkhouse, and research shop/storage building are proposed to reduce or eliminate impacts to important habitat areas.

The Service's Research and Management Studies (4 RM 6) and Appropriate Refuge Uses policies (603 FW1.10D(4)) indicate priority for scientific investigatory studies that contribute to the enhancement, protection, use, preservation, and management of native wildlife populations and their habitat as well as

their natural diversity. Projects that contribute to refuge-specific management, where applicable, would be given a higher priority over other requests. Priority would also be given to research that documents the understanding and impacts associated with climate change and global warming. Research applicants must submit a detailed proposal that outlines:

1) objectives of the study;
2) justification for the study;
3) detailed methodology and schedule; include measures to minimize wildlife and habitat disturbance or impacts through study design, including location, timing, scope, number of permittees, study methods, number of study sites, etc.;
4) potential impacts on refuge wildlife or habitat, including disturbance (short- and long-term), injury and/or mortality.
5) costs to the Refuge Complex, if any, including staff time and equipment;
6) expected outcomes or results; and
7) a timeline for submitting progress reports and final products (i.e., reports, theses, dissertations, publications).

Research proposals would be reviewed by Complex staff and others as appropriate to weigh the anticipated impacts versus the benefits of the research activity to refuge management and understanding of natural systems. This would form the basis for allowing the project to proceed or be denied. If the proposal is approved, the Project Leader would issue a Special Use Permit (SUP) which would set the terms and conditions of the study to avoid and/or minimize the impacts on refuge resources, public use activities, and refuge field operations. All research projects would be assessed during implementation to ensure that impacts remain within acceptable levels. Projects which would result in unacceptable refuge impacts will not be found compatible and will not be approved

Research would not be allowed on refuge lands if one or more of the following criteria apply to a project proposal:

- Research that conflicts with other ongoing research, monitoring, or management programs will not be granted.
- Research projects that can be accomplished off the refuge are less likely to be approved.
- Highly intrusive and manipulative research or research which causes undue disturbance is generally not permitted in order to protect native bird and marine mammal populations.
- If staffing or logistics make it impossible for Complex staff to monitor the researcher, the permit is likely to be denied.
- If the activity is in a sensitive area, the research request may be denied, depending on the specific circumstances.

Availability of Resources

Complex staff responsibilities for projects by non-USFWS entities include the following: review of proposals, prepare SUPs and compliance documents (e.g., Section 7, Section 106 of the National Historic Preservation Act), and monitor project implementation to ensure that impacts and conflicts remain within acceptable levels to ensure compatibility over time. Additional administrative support, logistical, and operational support may also be provided depending on each specific request. Estimated costs for one-time (e.g., prepare SUP) and annually re-occurring tasks by refuge staff and other Complex employees will be determined for each project. Limited funds for the Complex's administration of these projects (estimated $3,000 per requested project) may be available within the general operating budget of the Washington Maritime NWR Complex, which administers Protection Island NWR. In some cases, the Complex staff may act as a cooperator on research projects. The funding for these projects may be cost-

shared and in some cases, specially designated funds may be utilized for the operation and administration of the projects.

The Complex has the following annual staffing and funding to administratively support and monitor the three research projects currently taking place on refuge lands (see table below). Any substantial increase in the number of projects would create a need for additional resources to oversee the administration and monitoring of the investigators and their projects. Any substantial additional costs above those itemized below (not including one-time costs associated with facility replacement and relocation) will result in finding a project not compatible unless expenses are offset by the investigator(s), sponsoring agency, or organization.

Category	One Time Expense	Recurring Expense
Administration (Evaluation of Applications, Management of Permits, Oversight)	$3,000	
Monitoring and participation	$6,000	$1,500
Maintenance		$2,250
Totals	$9,000	$3,750

Anticipated Impacts of the Use

Use of Protection Island NWR to conduct research, scientific collection, and surveys will generally benefit plant populations, wildlife, and habitats. The impacts of research activities would be project and site-specific, and would vary depending on the scope and type of research conducted. Scientific findings gained through these projects provide important information regarding life-history needs of species and species groups as well as identify or refine management actions to achieve resource management objectives in refuge management plans (especially CCPs). Reducing uncertainty regarding wildlife and habitat responses to refuge management actions in order to achieve desired outcomes reflected in resource management objectives is essential for adaptive management in accordance with 522 DM 1.

Data collection techniques will generally have negligible animal mortality or disturbance, habitat destruction, no introduction of contaminants, or no introduction of non-indigenous species. In contrast, projects involving the collection of biotic samples (plants or animals) or requiring intensive ground-based data or sample collection will have short-term impacts. To reduce impacts, the minimum number of samples (e.g., water, soils, vegetative litter, plants, macroinvertebrates, vertebrates) will be collected for identification and/or experimentation and statistical analysis. Where possible, researchers would coordinate and share collections to reduce sampling needed for multiple projects. For example, if one investigator collects fish for a diet study and another researcher examines otoliths, then it may be possible to accomplish sampling for both projects with one collection effort.

Some level of disturbance is expected with all research activities since most researchers will be entering areas that are normally closed to the public and, depending on specific research activities, may also be collecting samples or handling wildlife. However, minimal impact to Refuge wildlife and habitats will be expected with research studies because SUPs will include conditions to ensure that impacts to wildlife and habitats are kept to a minimum

Direct damage or alteration to the habitat from researchers would be minor due to the research proposal evaluation process and stipulations imposed through the SUP. However, some increase in invasive plants is possible from ground disturbance and/or transportation of source seed on research equipment and personnel, and rodents and disease organisms could potentially be transferred from boats and trapping equipment. Likewise, there could be localized and temporary effects resulting in direct impacts such as vegetation trampling, collecting of soil and plant samples, or trapping and handling of wildlife. Other potential, but localized and temporary, effects would include wildlife disturbance, which is expected with

some research activities. Researcher disturbance could result in altering wildlife behavior. However, wildlife disturbance (including altered behavior) will be localized and temporary in nature. Only research with reasonably certain short-term effects from disturbance would be permitted. Impacts may also occur from infrastructure necessary to support projects (e.g., permanent transects or plot markers, exclosure devices, monitoring equipment, solar panels to power unattended monitoring equipment).

Spread of invasive plants and/or pathogens is possible from ground disturbance and/or transportation of project equipment and personnel, but it will be minimized or eliminated by requiring proper cleaning of investigator equipment and clothing as well as quarantine methods, where necessary. If an unacceptable spread of invasive species is anticipated to occur, then the project will be found not compatible without a restoration or mitigation plan.

The combination of stipulations identified below and conditions included in any SUP(s) will ensure that proposed projects contribute to the enhancement, protection, conservation, and management of native wildlife populations and their habitats on the refuge(s). As a result, these projects will help fulfill refuge purposes; contribute to the mission of the NWRS; and maintain the biological integrity, diversity, and environmental health of the refuge.

Public Review and Comment

Public review and comment on this compatibility determination occured in conjunction with the release of the Draft CCP/WSP/EA.

Determination

_____ The use is not compatible.
__X__ The use is compatible with the following stipulations.

Stipulations Necessary to Ensure Compatibility

If the proposed research methods would impact or potentially impact refuge resources (habitat or wildlife), it must be demonstrated that the research is essential (i.e., critical to survival of a species; refuge islands provide only or critical habitat for a species; contributes significantly to understanding of impacts from climate change; or assessment and/or restoration after cataclysmic events), and the researcher must identify the issues in advance of the impact. Highly intrusive or manipulative research is generally not permitted in order to protect native bird and marine mammal populations. Stipulation and provisions would include the following:

User Stipulations:

- Potential researchers must submit a written, detailed research proposal to the Project Leader at least 6 months prior to start of field work. The required proposal format would be provided to researchers.
- Researchers are responsible for acquiring and/or renewing any necessary State and Federal permits prior to beginning or continuing their project.
- Research will adhere to scientifically defensible protocols for data collection, where available and feasible.
- The refuge staff will be provided with copies of raw data (preferably electronic database format) at the conclusion of the project.
- Upon completion of the project or annually, research sites must be cleaned up to the Project Leader's satisfaction and all physical markers removed. For long-term projects, conditions for clean-up and removal of equipment and physical markers would be stipulated in the SUP.

- Investigator(s) and support staff will follow all refuge-specific regulations that specify access and travel on the refuge(s).

Administrative Stipulations:

- A Section 7 consultation under the Endangered Species Act would be required for research activities that may affect a federally threatened, endangered, or proposed species. Only projects which have no effect or will result in not likely to adversely affect determinations will be considered compatible.
- Research that does not involve birds generally will only be allowed outside of the breeding season of avian species using the specific island(s), unless it can be demonstrated that there likely will be no impact to those breeding species. If a research project can only be conducted during the breeding season, such studies will only be permitted where there are specific protocols to minimize disturbance.
- Approved research projects will be conducted under a Complex-issued SUP which will have additional project-specific stipulations.
- Annual or other short-term SUPs are preferred; however, some permits will be for a longer period, if needed, to facilitate the research. All SUPs will have a definite termination date in accordance with 5 RM 17.11. Renewals will be subject to Project Leader review of research data, status reports, compliance with compatibility determination and permit stipulations, and permits.
- If unacceptable impacts or issues arise or are noted by the Complex staff, then the Project Leader can suspend/modify conditions/terminate on-refuge research that is already permitted and in progress.
- All samples collected on refuge lands are the property of the Service even while in the possession of the investigator(s). Any future work with previously collected samples not clearly identified in the project proposal will require submission of a subsequent proposal for review and approval. In addition, a new SUP will be required for additional project work. For samples or specimens to be stored at other facilities (e.g., museums), a Memorandum of Understanding will be necessary.
- After approval, all projects also will be assessed during implementation to ensure impacts and conflicts remain within acceptable levels.
- Projects which are not covered by the CCP may require additional NEPA documentation.

Justification

Research is not considered a priority public use by NWRS policy (603 FW1); however, Protection Island's refuge purpose includes "…and to provide for scientific research…" Two provisions of the National Wildlife Refuge Improvement Act of 1997 are to "maintain biological integrity, diversity and environmental health" and to conduct "inventory and monitoring." Refuge plans and actions based on research and monitoring provide an informed approach to habitat, wildlife, and public use management programs. Seabird and pinniped conservation and management at the Complex are based upon best available scientific information from research combined with long-term monitoring. Some research is used to address specific wildlife conservation questions, such as understanding the causes of reduced or declining seabird and/or pinniped populations and development of tools and techniques to aid recovery of threatened or endangered species. Other research has broader applicability, such as using a suite of seabird species as indicators of ocean health conditions and to document change in the larger marine environment and associated impacts associated with climate change and global warming.
Research, scientific collecting, and surveys on refuge lands are inherently valuable to the USFWS because they will expand scientific information available for resource management decisions. In addition, only projects which directly or indirectly contribute to the enhancement, protection, use, preservation, and management of refuge wildlife populations and their habitats generally will be authorized on refuge lands. In many cases, if it were not for the Complex staff providing access to refuge lands and waters along with some support, the project would never occur and less scientific information would be available to the USFWS and others to aid in managing and conserving these species. By allowing the use to occur under the stipulations described above, it is anticipated that wildlife species

which may be disturbed during the use of refuge habitats, would find sufficient food resources and resting places elsewhere on the refuge so their abundance and use will not be measurably lessened. Additionally, it is anticipated that monitoring, as needed, will prevent unacceptable or irreversible impacts to fish, wildlife, plants, and their habitats. As a result, these projects will not materially interfere with or detract from fulfilling refuge purposes and they would contribute to the mission of the NWRS, as well as maintaining the biological integrity, diversity, and environmental health of the refuges.

Mandatory 10- or 15-year Re-evaluation Date

Provide month and year for "allowed" uses only.
_____ Mandatory 15-year re-evaluation date (for wildlife-dependent public uses).
__X__ Mandatory 10-year re-evaluation date (for all uses other than wildlife-dependent public uses).

NEPA Compliance for Refuge Use Decision

_____ Categorical Exclusion without Environmental Action Statement
_____ Categorical Exclusion and Environmental Action Statement
__X__ Environmental Assessment and Finding of No Significant Impact
_____ Environmental Impact Statement and Record of Decision

Signatures approving and concurring with Compatibility Determination for Research, Scientific Collecting, and Survey Activities on Protection Island NWR (Use is compatible with stipulations)

Refuge Determination:

Refuge Manager/
Project Leader
Approval:

(Signature) 9/27/2010 (Date)

Concurrence:

Refuge Supervisor:

(Signature) 9/27/2010 (Date)

Regional Chief, National
Wildlife Refuge System:

(Signature) 9/27/10 (Date)

Compatibility Determination

Use: Environmental Education

Refuge Name: Protection Island National Wildlife Refuge

Refuge Purposes and Establishing/Acquisition Authorities

> *"The purposes of the refuge are to provide habitat for a broad diversity of bird species, with particular emphasis on protecting the nesting habitat of the bald eagle, tufted puffin, rhinoceros auklet, pigeon guillemot, and pelagic cormorant; to protect the hauling-out area of harbor seals; and to provide for scientific research and wildlife-oriented public education and interpretation"* (All lands, Protection Island National Wildlife Refuge Act, Public Law 977-333, Oct 15, 1982, 96 Stat. 1623).
>
> *". . . for the development, advancement, management, conservation, and protection of fish and wildlife resources . . ."* (340 acres under tideland lease, 16 U.S.C.742 f(a)(4), Fish and Wildlife Act of 1956)

National Wildlife Refuge System Mission

"The mission of the System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (National Wildlife Refuge System Administration Act of 1966, as amended, 16 U.S.C. 668dd-668ee).

Description of Use

Environmental education is a key component of the enabling legislation of Protection Island NWR. Protection Island is closed to public use so most environmental education would take place off-refuge. A limited amount of off-refuge environmental education currently takes place in partnership with the Port Townsend Marine Science Center. On-refuge environmental education will be limited and will consist of providing opportunities for volunteers to learn about the refuge and its resources while participating in stewardship projects and for college-level students to pursue environmental studies in accordance with Service policies and criteria.

Refuge staff and others would provide an educational context to stewardship projects which may include, but are not limited to, debris clean-up from island beaches, invasive vegetative species control, observation and monitoring of wildlife, and maintenance of facilities and equipment. The Complex will issue permits to allow students from regional colleges and universities to conduct environmental studies on Protection Island. Environmental studies will be of limited duration, complexity, and scale and will be geared toward students gaining field experience and knowledge of the National Wildlife Refuge System, Protection Island NWR, and its management.

Availability of Resources

Complex staff will identify, and in many cases participate in, educational stewardship opportunities for volunteers. Staff responsibilities for projects/studies proposed by students will include the following: review of proposals, prepare SUPs and compliance documents, and monitor project/study implementation to ensure that impacts and conflicts remain within acceptable levels to ensure compatibility over time. Additional administrative support, logistical and operational support may also be provided depending on each specific request. Estimated costs for one-time (e.g., prepare SUP) and annually re-occurring tasks

by Complex staff will be determined for each project. Limited funds for the Complex's administration of these projects/studies (estimated $2,500 per requested project) may be available within the general operating budget of the Washington Maritime Refuge Complex, which administers Protection Island NWR.

The Complex has the following staffing and funding over a 5-year period to administratively support and monitor the minimum number of stewardship projects (5) and environmental studies (2) identified in the CCP to take place over that timeframe. Any substantial increase in the number of projects/studies would create a need for additional resources to oversee the administration and monitoring of the studies. Any substantial additional costs above those itemized below will result in finding a project not compatible unless expenses are offset by the student(s) and/or the college and university.

Category	One Time Expense	Recurring Expense
Administration (Evaluation of Applications, Management of Permits, Oversight)	$7,000	$3,500
Monitoring and participation	$10,500	$3,500
Totals for five year period	$17,500	$7,000

Anticipated Impacts of the Use

Protection Island NWR educational stewardship projects will be designed to minimize disturbance to wildlife and habitat. Impacts will be site-specific and may include short-term disturbance to species using refuge shorelines during beach clean-up projects. Island vegetation may be minimally impacted as invasive vegetative species are removed. Wildlife observation and monitoring may disturb some species as volunteers move from one monitoring location to another. Maintenance of facilities and equipment may also result in very local disturbance depending on time and place of need.

Use of Protection Island NWR to conduct college-level environmental education will generally benefit plant populations, wildlife, and habitats. The impacts of individual studies would be site-specific, and would vary depending on the scope and type of study. Scientific findings gained through these studies will provide additional information for the Service to use in managing the refuge. In addition, it is the goal of this use to increase the student's knowledge and understanding of the refuge's unique wildlife and habitats, its linkage to the marine environment, and contribute to its and similar area's conservation. Data collection techniques will generally have minimal impacts on animal mortality or disturbance or habitat destruction; no introduction of contaminants; or no introduction of non-indigenous species. Studies involving the collection of biotic samples (plants or animals) or requiring intensive ground-based data or sample collection will have short-term impacts. To reduce impacts, the minimum number of samples (e.g., water, soils, vegetative litter, plants, macroinvertebrates, and vertebrates) will be collected for identification and/or experimentation and statistical analysis.

Some level of disturbance is expected with all study activities since most students will be entering areas that are normally closed to the public and, depending on specific study activities, may also be collecting samples or handling wildlife. However, minimal impact to refuge wildlife and habitats will be expected with studies because SUPs will include conditions to ensure that impacts to wildlife and habitats are kept to a minimum.

Direct damage or alteration to the habitat from students would be minor due to the study proposal evaluation process and stipulations imposed through the SUP. However, some increase in invasive plants is possible from ground disturbance and/or transportation of source seed on equipment and personnel, and rodents and disease organisms could potentially be transferred from boats and trapping equipment. Likewise there could be localized and temporary effects from vegetation trampling, colleting of soil and

plant samples, or trapping and handling of wildlife. Impacts may also occur from infrastructure necessary to support projects (permanent transects or plot markers, exclosure devices, monitoring equipment, etc.).

Spread of invasive plants and/or pathogens is possible from ground disturbance and/or transportation of project equipment and personnel, but it will be minimized or eliminated by requiring proper cleaning of investigator equipment and clothing as well as quarantine methods, where necessary. If an unacceptable spread of invasive species is anticipated to occur, then the study will be found not compatible.

There also could be localized and temporary effects from vegetation trampling, collecting of soil and plant samples, or trapping and handling of wildlife. Some level of disturbance is expected with these studies, especially if students enter areas closed to the public and collect samples or handle wildlife. However, wildlife disturbance (including altered behavior) will be localized and temporary in nature. Where long-term or cumulative unacceptable effects cannot be avoided, the project will not be found compatible.

The combination of stipulations identified below and conditions included in any SUP(s) will ensure that proposed studies minimize negative impacts to wildlife and habitats and positively contribute to the enhancement, protection, conservation, and management of native wildlife populations and their habitats on the refuge. As a result, these studies will help fulfill refuge purposes, contribute to the mission of the NWRS, and maintain the biological integrity, diversity, and environmental health of the refuge.

Public Review and Comment

Public review and comment on this compatibility determination occured in conjunction with the release of the Draft CCP/WSP/EA.

Determination

_____ The use is not compatible.
__X__ The use is compatible with the following stipulations.

Stipulations Necessary to Ensure Compatibility

Design and conduct educational stewardship projects to minimize impacts to wildlife. Beach clean-up projects will be conducted outside seabird and marine mammal breeding/pupping seasons. Invasive species control will be conducted at the best time of year to ensure successful control efforts balanced against potential wildlife disturbance. Any control around major seabird colonies will take place outside the breeding season. Sign, trail, and facility maintenance will take place outside breeding and pupping areas except in emergency situations.

Highly intrusive or manipulative studies generally will not be permitted in order to protect native bird and marine mammal populations. Stipulation and provisions would include the following:

User Stipulations:
- Potential students must submit a written, detailed study proposal to the Project Leader at least 1 month prior to start of field work. The required proposal format would be provided to students.
- Students are responsible for acquiring and/or renewing any necessary State and Federal permits prior to beginning or continuing their project.
- The Complex staff will be provided with copies of raw data (preferably electronic database format) at the conclusion of the study.

- Upon completion of the study or annually, study sites must be cleaned up to the Project Leader's satisfaction and all physical markers removed. For long-term studies, conditions for clean-up, and removal of equipment and physical markers would be stipulated in the SUP.
- Students and support staff will follow all refuge-specific regulations that specify access and travel on the refuge(s).

Administrative Stipulations:

- Design and conduct educational stewardship projects to minimize impacts to wildlife. Beach clean-up projects will be conducted outside seabird and marine mammal breeding/pupping seasons. Invasive species control will be conducted at the best time of year to ensure successful control efforts balanced against potential wildlife disturbance. Any control around major seabird colonies will take place outside the breeding season. Sign, trail, and facility maintenance will take place outside breeding and pupping except in emergency situations.
- Highly intrusive or manipulative studies generally will not be permitted in order to protect native bird and marine mammal populations.
- A Section 7 consultation under the Endangered Species Act would be required for studies that may affect a federally threatened, endangered, or proposed species. Only projects which have no effect or will result in not likely to adversely affect determinations will be considered compatible.
- Studies that do not involve birds generally will only be allowed outside of the breeding season of avian species using the specific island(s), unless it can be demonstrated that there likely will be no impact to those breeding species. If a study can only be conducted during the breeding season, such studies will only be permitted where there are specific protocols to minimize disturbance.
- Studies will adhere to scientifically defensible protocols for data collection, where available and feasible.
- Approved studies will be conducted under a Complex-issued SUP which will have additional project-specific stipulations.
- Annual or other short-term SUPs are preferred; however some permits will be for a longer period, if needed, to facilitate the study. All SUPs will have a definite termination date in accordance with 5 RM 17.11. Renewals will be subject to Project Leader review of research data, status reports, compliance with compatibility determination and permit stipulations, and permits.
- After approval, all projects also will be assessed during implementation to ensure impacts and conflicts remain within acceptable levels.
- If unacceptable impacts or issues arise or are noted by the Complex staff, then the Project Leader can suspend/modify conditions/terminate on-refuge studies that are already permitted and in progress.
- All samples collected on refuge lands are the property of the Service even while in the possession of the students. Any future work with previously collected samples not clearly identified in the study proposal will require submission of a subsequent proposal for review and approval. In addition, a new SUP will be required for additional project work. For samples or specimens to be stored at other facilities (e.g., museums), a Memorandum of Understanding will be necessary.

Justification

Wildlife-oriented education is part of the purposes of Protection Island NWR and therefore the environmental education program as described here is consistent with refuge purposes. Environmental education stewardship projects and studies on refuge lands are inherently valuable to the Service because they will enhance the public's knowledge of the refuge and its resources and expand scientific information available for resource management decisions. In addition, only studies which directly or indirectly contribute to the enhancement, protection, use, preservation, and management of refuge wildlife populations and their habitats generally will be authorized on refuge lands. In many cases, if it were not for the Complex staff providing access to refuge lands and waters along with some support, the study would never occur and less scientific information would be available to the Service and others to aid in

managing and conserving these species. By allowing the use to occur under the stipulations described above, it is anticipated that wildlife species which may be disturbed during the use would find sufficient food resources and resting places elsewhere on the refuge so their abundance and use of refuge habitats will not be measurably lessened. Additionally, it is anticipated that monitoring, as needed, will prevent unacceptable or irreversible impacts to fish, wildlife, plants, and their habitats. As a result, these studies will not materially interfere with or detract from fulfilling refuge purposes (including wilderness) and they would contribute to the mission of the NWRS, as well as maintaining the biological integrity, diversity, and environmental health of the refuges.

Mandatory 10- or 15-year Re-evaluation Date

Provide month and year for "allowed" uses only.
__X__ Mandatory 15-year re-evaluation date (for wildlife-dependent public uses).
_____ Mandatory 10-year re-evaluation date (for all uses other than wildlife-dependent public uses).

NEPA Compliance for Refuge Use Decision

_____ Categorical Exclusion without Environmental Action Statement
_____ Categorical Exclusion and Environmental Action Statement
__X__ Environmental Assessment and Finding of No Significant Impact
_____ Environmental Impact Statement and Record of Decision

Signatures approving and concurring with Compatibility Determination for Environmental Education on Protection Island NWR (Use is compatible with stipulations)

Refuge Determination:

Refuge Manager/
Project Leader
Approval:

(Signature) 9/27/2010 (Date)

Concurrence:

Refuge Supervisor:

(Signature) 9/27/2010 (Date)

Regional Chief, National
Wildlife Refuge System:

(Signature) 9/27/10 (Date)

Compatibility Determination

Use: Research, Scientific Collecting, and Survey Activities

Refuge Name: San Juan Islands National Wildlife Refuge

Refuge Purposes and Establishing/Acquisition Authorities

> *". . . reserved under jurisdiction of the Bureau of Sport Fisheries and Wildlife, United States Fish and Wildlife Service. . ."* (all lands, PLO 2249).
>
> *". . .facilitate the management of migratory birds for which the United States has a responsibility under international treaties and to further effectuate the purposes of the Migratory Bird Conservation Act."* (all lands, Proposal published in 38 FR 29831 on Oct 29, 1973 prior to PLO 5515, 1975)
>
> *"as a preserve, breeding ground and winter sanctuary for native birds."* (Smith and Minor Islands, E.O. 1959 of 1914)
>
> *". . .to secure for the American people of present and future generations the benefits of an enduring resource of wilderness"* (353 acres, all units of the refuge except for Smith, Minor, Turn, and a 5 acre portion of Matia Island, P.L. 94-557 of October 1976 and P.L. 88-577, the Wilderness Act of 1964.)
>
> *"lighthouse purposes."* Navigation aids maintained under the jurisdiction of the U.S. Coast Guard (~19 units, Executive Orders from 1854 and 1875).

National Wildlife Refuge System Mission

"The mission of the System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee]).

Description of Use

The Washington Maritime NWR Complex receives periodic requests from non-Service entities (e.g., universities, state agencies, other federal agencies, NGOs) to conduct research, scientific collecting, and surveys on San Juan Islands NWR. These projects can involve a wide range of natural and cultural resources as well as public-use management issues, including habitat use and life-history requirements for specific species/species groups, practical methods for habitat restoration, extent and severity of environmental contaminants, techniques to control or eradicate pest species, effects of climate change on environmental conditions and associated habitat/wildlife response, identification and analyses of paleontological specimens, wilderness character, modeling of wildlife populations, and assessing response of habitat/wildlife to disturbance from public uses. Projects may be species-specific, refuge-specific, or evaluate the relative contribution of the refuge to larger landscape (e.g., ecoregion, region, flyway, national, international) issues and trends.

The Service's Research and Management Studies (4 RM 6) and Appropriate Refuge Uses policies (603 FW1.10D(4)) indicate priority for scientific investigatory studies that contribute to the enhancement, protection, use, preservation, and management of native wildlife populations and their habitat as well as their natural diversity. Projects that contribute to refuge-specific and/or wilderness management, where

applicable, would be given a higher priority over other requests. Priority would also be given to research that documents the understanding and impacts associated with climate change and global warming. Research applicants must submit a detailed proposal that outlines:

1) objectives of the study;
2) justification for the study;
3) detailed methodology and schedule; include measures to minimize wildlife and habitat disturbance or impacts through study design, including location, timing, scope, number of permittees, study methods, number of study sites, etc;
4) potential impacts on refuge wildlife or habitat, including disturbance (short-and long-term), injury and/or mortality;
5) costs to the Refuge Complex, if any, including staff time and equipment;
6) expected outcomes or results; and
7) a timeline for submitting progress reports and final products (i.e., reports, theses, dissertations, publications).

Research proposals would be reviewed by Complex staff and others as appropriate to weigh the anticipated impacts versus the benefits of the research activity to refuge management and understanding of natural systems. This would form the basis for allowing the project to proceed or be denied. If the proposal is approved, the Project Leader would issue an SUP which would set the terms and conditions of the study to avoid and/or minimize the impacts on refuge resources, public use activities, and refuge field operations. All research projects would be assessed during implementation to ensure that impacts remain within acceptable levels. Projects which would result in unacceptable refuge impacts will not be found compatible and will not be approved.

Research would not be allowed on refuge lands if one or more of the following criteria apply to a project proposal:

- Research that conflicts with other ongoing research, monitoring, or management programs will not be granted.
- Research projects that can be accomplished off the refuge are less likely to be approved.
- Highly intrusive and manipulative research or research which causes undue disturbance is generally not permitted in order to protect native bird and marine mammal populations and wilderness values.
- If staffing or logistics make it impossible for Complex staff to monitor the researcher, the permit is likely to be denied.
- If the activity is in a sensitive area, the research request may be denied, depending on the specific circumstances.

Availability of Resources

Complex staff responsibilities for projects by non-Service entities include the following: review of proposals, prepare SUPs and compliance documents (e.g., Section 7, Section 106 of the National Historic Preservation Act), and monitor project implementation to ensure that impacts and conflicts remain within acceptable levels to ensure compatibility over time. Additional administrative support, logistical, and operational support may also be provided depending on each specific request. Estimated costs for one-time (e.g., prepare SUP) and annually re-occurring tasks by refuge staffs and other Complex employees will be determined for each project. Limited funds for the Complex's administration of these projects (estimated $3,500 per requested project) may be available within the general operating budget of the Washington Maritime NWR Complex, which administers San Juan Islands NWR. In some cases, the Complex staff may act as a cooperator on research projects. The funding for these projects may be cost-shared and in some cases, specially designated funds may be utilized for the operation and administration of the projects.

The Complex has the following funding to annually administratively support and monitor one research project on San Juan Islands NWR (see table below). Any substantial increase in the number of projects would create a need for additional resources to oversee the administration and monitoring of the investigators and their projects. Any substantial additional costs above those itemized below (not including one-time costs associated with facility replacement and relocation) could result in finding a project not compatible unless expenses are offset by the investigator(s), sponsoring agency, or organization.

Category	One-Time Expense	Recurring Expense
Administration (Evaluation of Applications, Management of Permits, Oversight)	$1,000	$1,000
Monitoring and participation	$2,500	$1,500
Totals	$3,500	$2,500

Anticipated Impacts of the Use

Use of San Juan Islands NWR to conduct research, scientific collection, and surveys will generally benefit plant populations, wildlife, and habitats. The impacts of research activities would be project and site-specific, and would vary depending on the scope and type of research conducted. Scientific findings gained through these projects provide important information regarding life-history needs of species and species groups, as well as identify or refine management actions to achieve resource management objectives in refuge management plans (especially CCPs). Reducing uncertainty regarding wildlife and habitat responses to refuge management actions in order to achieve desired outcomes reflected in resource management objectives is essential for adaptive management in accordance with 522 DM 1.

Data collection techniques will generally have negligible animal mortality or disturbance, habitat destruction, no introduction of contaminants, or no introduction of non-indigenous species. In contrast, projects involving the collection of biotic samples (plants or animals) or requiring intensive ground-based data or sample collection will have short-term impacts. To reduce impacts, the minimum number of samples (e.g., water, soils, vegetative litter, plants, macroinvertebrates, vertebrates) will be collected for identification and/or experimentation and statistical analysis. Where possible, researchers would coordinate and share collections to reduce sampling needed for multiple projects. For example, if one investigator collects fish for a diet study and another research examines otoliths, then it may be possible to accomplish sampling for both projects with one collection effort.

Some level of disturbance is expected with all research activities since most researchers will be entering areas that are normally closed to the public and, depending on specific research activities, may also be collecting samples or handling wildlife. However, minimal impact to refuge wildlife and habitats will be expected with research studies because SUPs will include conditions to ensure that impacts to wildlife and habitats are kept to a minimum. Only research with reasonably certain short-term effects from disturbance would be permitted.

Direct damage or alteration to the habitat from researchers would be minor due to the study proposal evaluation process and stipulations imposed through the SUP. However, some increase in invasive plants is possible from ground disturbance and/or transportation of source seed on equipment and personnel, and rodents and disease organisms could potentially be transferred from boats and trapping equipment. Likewise there could be localized and temporary effects from vegetation trampling, colleting of soil and plant samples, or trapping and handling of wildlife. Impacts may also occur from infrastructure necessary to support projects (permanent transects or plot markers, exclosure devices, monitoring equipment, etc). Spread of invasive plants and/or pathogens is possible from ground disturbance and/or transportation of project equipment and personnel, but it will be minimized or eliminated by requiring proper cleaning of

investigator equipment and clothing as well as quarantine methods, where necessary**.** If an unacceptable spread of invasive species is anticipated to occur, then the project will be found not compatible without a restoration or mitigation plan.

The combination of stipulations identified below and conditions included in any SUP(s) will ensure that proposed projects minimize negative impacts to wildlife and habitats and positively contribute to the enhancement, protection, conservation, and management of native wildlife populations and their habitats on the refuge. As a result, these projects will help fulfill refuge purposes, contribute to the mission of the NWRS, and maintain the biological integrity, diversity, and environmental health of the refuge.

Public Review and Comment

Public review and comment on this compatibility determination occured in conjunction with the release of the Draft CCP/WSP/EA.

Determination

_____ The use is not compatible.
__X__ The use is compatible with the following stipulations.

Stipulations Necessary to Ensure Compatibility

If the proposed research methods would impact or potentially impact refuge resources (habitat or wildlife), it must be demonstrated that the research is essential (i.e., critical to survival of a species; refuge islands provide only or critical habitat for a species; contributes significantly to understanding of impacts from climate change; or assessment and/or restoration after cataclysmic events), and the researcher must identify the issues in advance of the impact. Highly intrusive or manipulative research is generally not permitted in order to protect native bird and marine mammal populations and wilderness values. Projects that represent public or private economic use of the natural resources of any national wildlife refuge (e.g., bioprospecting), in accordance with 16 U.S.C. 715s, must contribute to the achievement of the national wildlife refuge purposes or the National Wildlife Refuge System mission to be compatible (50 C.F.R. 29.1). Stipulations and provisions would include the following:

User Stipulations:
- Potential researchers must submit a written, detailed research proposal to the Project Leader at least 6 months prior to start of field work. The required proposal format would be provided to researchers.
- Researchers are responsible for acquiring and/or renewing any necessary State and Federal permits prior to beginning or continuing their project.
- Research will adhere to scientifically defensible protocols for data collection, where available and feasible.
- Research progress reports are required at least annually, and final reports are due within one year of the completion of the project, unless negotiated otherwise. The minimum required elements for a progress report will be provided to investigator(s).
- The refuge staff will be provided with copies of raw data (preferably electronic database format) at the conclusion of the project.
- Upon completion of the project or annually, research sites must be cleaned up to the Project Leader's satisfaction and all physical markers removed. For long-term projects, conditions for clean-up and removal of equipment and physical markers would be stipulated in the Special Use Permit.
- Investigator(s) and support staff will follow all refuge-specific regulations that specify access and travel on the refuge(s).

Administrative Stipulations:

- Any proposed research by the Service or its agents within wilderness would have to comply with the provisions of the existing Minimum Requirements Analysis (Appendix H). Anyone not acting as an agent of the Service and requesting to conduct research in wilderness must prepare an MRA consistent with Service policy and adhere to the requirements of the Wilderness Act of 1964 (16 U.S.C. 1131-1136).
- A Section 7 consultation under the Endangered Species Act would be required for research activities that may affect a federally threatened, endangered, or proposed species. Only projects which have no effect or will result in not likely to adversely affect determinations will be considered compatible.
- Research that does not involve birds generally will only be allowed outside of the breeding season of avian species using the specific island(s), unless it can be demonstrated that there likely will be no impact to those breeding species. If a research project can only be conducted during the breeding season, such studies will only be permitted where there are specific protocols to minimize disturbance.
- Approved research projects will be conducted under a Complex-issued SUP which will have additional project-specific stipulations.
- Annual or other short-term SUPs are preferred; however, some permits will be for a longer period, if needed, to facilitate the research. All SUPs will have a definite termination date in accordance with 5 RM 17.11. Renewals will be subject to Project Leader review of research data, status reports, compliance with compatibility determination and permit stipulations, and permits.
- If unacceptable impacts or issues arise or are noted by the Complex staff, then the Project Leader can suspend/modify conditions/terminate on-refuge research that is already permitted and in progress.
- All samples collected on refuge lands are the property of the Service even while in the possession of the investigator(s). Any future work with previously collected samples not clearly identified in the project proposal will require submission of a subsequent proposal for review and approval. In addition, a new SUP will be required for additional project work. For samples or specimens to be stored at other facilities (e.g., museums), a Memorandum of Understanding will be necessary
- After approval, all projects also will be assessed during implementation to ensure impacts and conflicts remain within acceptable levels.
- Projects which are not covered by the CCP may require additional NEPA documentation.

Justification

Research is not considered a priority public use by NWRS policy (603 FW1); however, it contributes to two provisions of the National Wildlife Refuge Improvement Act of 1997, which are to "maintain biological integrity, diversity and environmental health" and to conduct "inventory and monitoring." Refuge plans and actions based on research and monitoring provide an informed approach to habitat, wildlife, and public use management programs. Migratory bird and pinniped conservation and management at the Complex are based upon best available scientific information from research combined with long-term monitoring. Some research is used to address specific wildlife conservation questions, such as understanding the causes of reduced or declining seabird and/or pinniped populations and development of tools and techniques to aid recovery of threatened or endangered species. Other research has broader applicability, such as using a suite of seabird species as indicators of ocean health conditions and to document change in the larger marine environment and associated impacts associated with climate change and global warming.

Research, scientific collecting, and surveys on refuge lands are inherently valuable to the Service because they will expand scientific information available for resource management decisions. In addition, only projects which directly or indirectly contribute to the enhancement, protection, use, preservation, and management of refuge wildlife populations and their habitats generally will be authorized on refuge lands. In many cases, if it were not for the Complex staff providing access to refuge lands and waters along with

some support, the project would not occur and less scientific information would be available to the Service and others to aid in managing and conserving these species. By allowing the use to occur under the stipulations described above, it is anticipated that wildlife species which may be disturbed during the use would find sufficient food resources and resting places elsewhere on the refuge so their abundance and use will not be measurably lessened on the refuge. Additionally, it is anticipated that monitoring, as needed, will prevent unacceptable or irreversible impacts to fish, wildlife, plants, and their habitats. As a result, these projects will not materially interfere with or detract from fulfilling refuge purposes (including wilderness) and they would contribute to the mission of the NWRS as well as maintaining the biological integrity, diversity, and environmental health of the refuges.

Mandatory 10- or 15-year Re-evaluation Date

Provide month and year for "allowed" uses only.
_____ Mandatory 15-year re-evaluation date (for wildlife-dependent public uses).
__X__ Mandatory 10-year re-evaluation date (for all uses other than wildlife-dependent public uses).

NEPA Compliance for Refuge Use Decision

_____ Categorical Exclusion without Environmental Action Statement
_____ Categorical Exclusion and Environmental Action Statement
__X__ Environmental Assessment and Finding of No Significant Impact
_____ Environmental Impact Statement and Record of Decision

Signatures approving and concurring with Compatibility Determination for Research, Scientific Collecting, and Survey Activities on San Juan Islands NWR (Use is compatible with stipulations)

Refuge Determination

Refuge Manager/
Project Leader
Approval:

(Signature) 9/27/2010 (Date)

Concurrence

Refuge Supervisor:

(Signature) 9/27/2010 (Date)

Regional Chief, National
Wildlife Refuge System:

(Signature) 9/27/10 (Date)

Compatibility Determination

Use: Environmental Education

Refuge Name: San Juan Islands National Wildlife Refuge

Refuge Purposes and Establishing/Acquisition Authorities

> *". . . reserved under jurisdiction of the Bureau of Sport Fisheries and Wildlife, United States Fish and Wildlife Service. . ."* (all lands, PLO 2249).
>
> *". . .facilitate the management of migratory birds for which the United States has a responsibility under international treaties and to further effectuate the purposes of the Migratory Bird Conservation Act."* (all lands, Proposal published in 38 FR 29831 on Oct 29, 1973 prior to PLO 5515, 1975)
>
> *"as a preserve, breeding ground and winter sanctuary for native birds."* (Smith and Minor Islands, E.O. 1959 of 1914)
>
> *". . .to secure for the American people of present and future generations the benefits of an enduring resource of wilderness"* (353 acres, all units of the refuge except for Smith, Minor, Turn, and a 5 acre portion of Matia Island, P.L. 94-557 of October 1976 and P.L. 88-577, the Wilderness Act of 1964.)
>
> *"lighthouse purposes."* Navigation aids maintained under the jurisdiction of the U.S. Coast Guard (~19 units, Executive Orders from 1854 and 1875).

National Wildlife Refuge System Mission

"The mission of the System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee]).

Description of Use

In the NWRS Improvement Act, the United States Congress declared environmental education as one of six priority wildlife-dependent public uses of the NWRS. Environmental education activities seek to increase public knowledge and understanding of wildlife and habitats and contribute to its conservation. On-refuge environmental education on San Juan Islands NWR will consist of interpretive panels, volunteer stewardship projects, and opportunities to pursue environmental studies in accordance with Service policies and criteria to a limited number of college level students. Offering students the opportunity to conduct environmental studies will increase their knowledge and understanding of refuge resources and contribute to our knowledge base.

Interpretive panels will be located on Matia and Turn Islands, which are the only islands open to the public.

Stewardship projects will be geared to accomplishing a management need while at the same time educating the participating volunteer(s). Projects may take place on any island and include, but are not

limited to, debris clean-up from island beaches, invasive vegetative species control, observation and monitoring of wildlife, and maintenance of refuge trails, signs, and facilities.

The Complex will issue permits to allow students from regional colleges and universities to conduct environmental studies on San Juan Islands NWR. Environmental studies will be of limited duration, complexity, and scale, and will be geared toward students gaining field experience and knowledge of the NWRS, San Juan Islands NWR, and its management. These study activities may take place on any island in the refuge.

Availability of Resources

Complex staff responsibilities for environmental education that takes place at interpretive panels will consist of maintaining the panels and monitoring vegetative impacts associated with placement and use.

Stewardship projects will require more intense Complex staff participation. Beach clean-up projects will need to be coordinated to take advantage of wildlife seasonal use and tides. Some islands will require the refuge to transport volunteers to the site and back and facilitate removal of debris. Other islands may be cleaned through local "adopt an island" groups which will handle transportation and debris removal and disposal. In these cases, Complex staff will have limited participation, such as determining the best time of the year to conduct cleanup operations. Invasive species control and maintenance of trails, signs, and facilities will require Complex staff participation. Wildlife observation and monitoring may run the gamut of intense to minimal staff participation depending on the area, specie, and complexity of monitoring effort.

Staff responsibilities for projects/studies proposed by students will include the following: review of proposals, prepare special use permits (SUPs) and compliance documents, and monitor project/study implementation to ensure that impacts and conflicts remain within acceptable levels to ensure compatibility over time. Additional administrative support, logistical and operational support may also be provided depending on each specific request. Estimated costs for one-time (e.g., prepare SUP) and annually re-occurring tasks by Complex staff will be determined for each project. Limited funds for the Complex's administration of these projects/studies (estimated $3,000 per requested project) may be available within the general operating budget of the Washington Maritime NWR Complex, which administers San Juan Islands NWR.

The Complex has the following staffing and funding to administratively support and monitor the minimum number of stewardship projects (5) and environmental studies (1) identified in the CCP to take place over a five-year period. Any substantial increase in the number of projects/studies would create a need for additional resources to oversee the administration and monitoring of the studies. Any substantial additional costs above those itemized below will result in finding a project not compatible unless expenses are offset by the student(s) and/or the college and university.

Category	One Time Expense	Recurring Expense
Administration (Evaluation of Applications, Management of Permits, Oversight)	$6,000	$3,000
Monitoring and participation	$12,000	$3,000
Totals for five year period	$18,000	$6,000

Anticipated Impacts of the Use

Environmental education, through use of interpretive panels, will take place on Matia and Turn Islands and will consist of panels placed at strategic locations in areas open to the public. Matia Island will have one panel at the Rolfe Cove access point, one at the wilderness trailhead, and one at the west end of the campground. Turn will have three large interpretive panels: one located at the main access point, one east of the camping area at trail head, and one in the camping area. In addition there will be up to five small panels placed at various locations along the trail sufficiently spaced as to not concentrate use. Localized effects could include limited vegetation trampling and compaction of soils at these locations as the visiting public gathers to study the panels

Educational stewardship projects will be designed to minimize disturbance to wildlife and habitat. Impacts will be site specific and may include short term disturbance to species using refuge shorelines during beach cleanup projects. Island vegetation may be minimally impacted as invasive vegetative species are removed. Wildlife observation and monitoring may disturb some specie as volunteers move from one monitoring location to another. Maintenance of facilities and equipment may also result in very local disturbance depending on time and place of need.

Use of San Juan Islands NWR to conduct college level environmental education will generally benefit plant populations, wildlife, and habitats. The impacts of individual studies would be site-specific, and would vary depending on the scope and type of study. Scientific findings gained through these studies will provide additional information for the Service to use in managing the refuge. In addition, it is the goal of this use to increase the student's knowledge and understanding of the refuge's unique wildlife and habitats, its linkage to the marine environment, and contribute to its and similar area's conservation. Data collection techniques will generally have minimal impacts on animal mortality or disturbance, or habitat destruction; no introduction of contaminants; or no introduction of non-indigenous species. Studies involving the collection of biotic samples (plants or animals) or requiring intensive ground-based data or sample collection will have short-term impacts. To reduce impacts, the minimum number of samples (e.g., water, soils, vegetative litter, plants, macroinvertebrates, and vertebrates) will be collected for identification and/or experimentation and statistical analysis.

Some level of disturbance is expected with all study activities since most students will be entering areas that are normally closed to the public and, depending on specific study activities, may also be collecting samples or handling wildlife. However, minimal impact to refuge wildlife and habitats will be expected with studies because SUPs will include conditions to ensure that impacts to wildlife and habitats are kept to a minimum.

Direct damage or alteration to the habitat from students would be minor due to the study proposal evaluation process and stipulations imposed through the SUP. However, some increase in invasive plants is possible from ground disturbance and/or transportation of source seed on equipment and personnel, and rodents and disease organisms could potentially be transferred from boats and trapping equipment. Likewise there could be localized and temporary effects from vegetation trampling, colleting of soil and plant samples, or trapping and handling of wildlife. Impacts may also occur from infrastructure necessary to support projects (permanent transects or plot markers, exclosure devices, monitoring equipment, etc).

Spread of invasive plants and/or pathogens is possible from ground disturbance and/or transportation of project equipment and personnel, but it will be minimized or eliminated by requiring proper cleaning of investigator equipment and clothing as well as quarantine methods, where necessary. If after all practical measures are taken and unacceptable spread of invasive species is anticipated to occur, then the study will be found not compatible.

The combination of stipulations identified below and conditions included in any SUP(s) will ensure that proposed studies contribute to the enhancement, protection, conservation, and management of native wildlife populations and their habitats on the refuge(s). As a result, these studies will help fulfill refuge purposes; contribute to the mission of the NWRS; and maintain the biological integrity, diversity, and environmental health of the refuge.

Public Review and Comment

Public review and comment on this compatibility determination occured in conjunction with the release of the Draft CCP/WSP/EA.

Determination

_____ The use is not compatible.
__X__ The use is compatible with the following stipulations.

Stipulations Necessary to Ensure Compatibility

User Stipulations:

- Potential students must submit a written, detailed study proposal to the Project Leader at least 1 month prior to start of field work. The required proposal format would be provided to researchers.
- Students are responsible for acquiring and/or renewing any necessary State and Federal permits prior to beginning or continuing their project.
- The Complex staff will be provided with copies of raw data (preferably electronic database format) at the conclusion of the study.
- Upon completion of the study or annually, study sites must be cleaned up to the Project Leader's satisfaction and all physical markers removed. For long-term studies, conditions for clean-up, and removal of equipment and physical markers would be stipulated in the SUP.
- Students and support staff will follow all refuge-specific regulations that specify access and travel on the refuge(s).

Administrative Stipulations:

- Design and conduct educational stewardship projects to minimize impacts to wildlife. Beach clean-up projects will be conducted outside seabird and marine mammal breeding/pupping seasons. Invasive species control will be conducted at the best time of year to ensure successful control efforts balanced against potential wildlife disturbance. Any control around major seabird colonies will take place outside the breeding season. Sign, trail, and facility maintenance will take place outside breeding and pupping areas except in emergency situations.
- Highly intrusive or manipulative studies generally will not be permitted in order to protect native bird and marine mammal populations.
- A Section 7 consultation under the Endangered Species Act would be required for studies that may affect a federally threatened, endangered, or proposed species. Only projects which have no effect or will result in not likely to adversely affect determinations will be considered compatible.
- Studies that do not involve birds generally will only be allowed outside of the breeding season of avian species using the specific island(s), unless it can be demonstrated that there likely will be no impact to those breeding species. If a study can only be conducted during the breeding season, such studies will only be permitted where there are specific protocols to minimize disturbance.
- Studies will adhere to scientifically defensible protocols for data collection, where available and feasible.
- Approved studies will be conducted under a Complex-issued SUP which will have additional project-specific stipulations.

- Annual or other short-term SUPs are preferred; however some permits will be for a longer period, if needed, to facilitate the study. All SUPs will have a definite termination date in accordance with 5 RM 17.11. Renewals will be subject to Project Leader review of research data, status reports, compliance with compatibility determination and permit stipulations, and permits.
- If unacceptable impacts or issues arise or are noted by the Complex staff, then the Project Leader can suspend/modify conditions/terminate on-refuge studies that are already permitted and in progress.
- All samples collected on refuge lands are the property of the Service even while in the possession of the students. Any future work with previously collected samples not clearly identified in the study proposal will require submission of a subsequent proposal for review and approval. In addition, a new SUP will be required for additional project work. For samples or specimens to be stored at other facilities (e.g., museums), a Memorandum of Understanding will be necessary.

Justification

Environmental education stewardship projects and studies on refuge lands are inherently valuable to the Service because they will enhance the public's knowledge of the refuge and its resources and expand scientific information available for resource management decisions. In addition, only studies which directly or indirectly contribute to the enhancement, protection, use, preservation, and management of refuge wildlife populations and their habitats generally will be authorized on refuge lands. In many cases, if it were not for the Complex staff providing access to refuge lands and waters along with some support, the study would never occur and less scientific information would be available to the Service and others to aid in managing and conserving these species. By allowing the use to occur under the stipulations described above, it is anticipated that wildlife species which may be disturbed during the use would find sufficient food resources and resting places elsewhere on the refuge so their abundance and use will not be measurably lessened. Additionally, it is anticipated that monitoring, as needed, will prevent unacceptable or irreversible impacts to fish, wildlife, plants, and their habitats. As a result, these studies/projects will not materially interfere with or detract from fulfilling refuge purposes (including wilderness) and they would contribute to the Mission of the NWRS as well as maintaining the biological integrity, diversity, and environmental health of the refuges.

Mandatory 10- or 15-year Re-evaluation Date

Provide month and year for "allowed" uses only.
___X___ Mandatory 15-year re-evaluation date (for wildlife-dependent public uses).
_____ Mandatory 10-year re-evaluation date (for all uses other than wildlife-dependent public uses).

NEPA Compliance for Refuge Use Decision

_____ Categorical Exclusion without Environmental Action Statement
_____ Categorical Exclusion and Environmental Action Statement
____X__ Environmental Assessment and Finding of No Significant Impact
_____ Environmental Impact Statement and Record of Decision

Signatures approving and concurring with Compatibility Determination for Environmental Education on San Juan Islands NWR (Use is compatible with stipulations)

Refuge Determination

Refuge Manager/
Project Leader
Approval: _____ (Signature) 9/27/2010 (Date)

Concurrence

Refuge Supervisor: _____ (Signature) 9/27/2010 (Date)

Regional Chief, National
Wildlife Refuge System: _____ (Signature) 9/27/10 (Date)

Compatibility Determination

Uses: Wildlife observation, photography, and interpretation

Refuge Name: San Juan Islands National Wildlife Refuge

City/County and State: San Juan County, Island County, and Skagit County, Washington

Refuge Purposes and Establishing/Acquisition Authorities:

> *". . . reserved under jurisdiction of the Bureau of Sport Fisheries and Wildlife, United States Fish and Wildlife Service. . ."* (all lands, PLO 2249).
>
> *". . .facilitate the management of migratory birds for which the United States has a responsibility under international treaties and to further effectuate the purposes of the Migratory Bird Conservation Act."* (all lands, Proposal published in 38 FR 29831 on Oct 29, 1973 prior to PLO 5515, 1975)
>
> *"as a preserve, breeding ground and winter sanctuary for native birds."* (Smith and Minor Islands, E.O. 1959 of 1914)
>
> *". . .to secure for the American people of present and future generations the benefits of an enduring resource of wilderness"* (353 acres, all units of the refuge except for Smith, Minor, Turn, and a 5 acre portion of Matia Island, P.L. 94-557 of October 1976 and P.L. 88-577, the Wilderness Act of 1964.)
>
> *"lighthouse purposes."* Navigation aids maintained under the jurisdiction of the U.S. Coast Guard (~19 units, Executive Orders from 1854 and 1875).

National Wildlife Refuge System Mission:

> "The mission of the [National Wildlife Refuge] System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee]).

Description of Uses:

Conduct and allow access for wildlife-dependent priority public uses (wildlife observation, photography, and interpretation) as provided for under the National Wildlife Refuge System Improvement Act of 1997. These uses will occur on-refuge on Matia and Turn Islands with specific conditions as noted in this determination.

On Matia Island these uses will occur along the refuge trail and at the access point and shoreline at Rolfe Cove. Three proposed interpretive panels will be installed at the access area and trailhead. Additional regulation signs will be placed at non-permitted access points, which tend to be the pocket beaches on the west, south, and east sides of the island. Current facilities include a 1.3-mile trail, four large refuge information signs, regulatory signage, and trailhead signs maintained by the Service; an information kiosk, picnic tables, composting toilet, seasonal dock (April-October), and two mooring buoys maintained

by Washington State Parks under a Memorandum of Understanding with the Service. Washington State Parks also assists with trail maintenance.

On Turn Island these uses will occur along the refuge trail and the access areas and associated shoreline on the southwest end of the island. Three proposed interpretive panels will be placed in the access area and up to five along the trail. A large refuge sign, trailhead signs, and some regulatory signs are maintained by the Service along with the trail. A kiosk, two composting toilets, picnic tables, and three mooring buoys are maintained by Washington State Parks at the access areas under a Memorandum of Understanding with the Service. Washington State Parks also assists with trail maintenance.

Public use access is year-round, day-use only, except for camping areas managed by Washington State Parks at the access areas. Camping is addressed in a separate Appropriateness Finding and Compatibility Determination.

Wildlife observation, photography, and interpretive activities seek to increase awareness, enjoyment, and understanding of the refuge's wildlife and plant resources. Interpretive panels will be located at the access areas and trailheads at Matia and Turn Islands and at several locations along the trail on Turn Island. Wildlife observation and photography will take place from refuge trails or from boats circumnavigating the islands.

Availability of Resources:

The following funds will be required to run a program as designed under the CCP. The projected need represents an increase of approximately 150% in recurring expenses compared to current funding for this program. For the one-time expenses, all available sources will be investigated.

Category	**One-time Expense**	**Recurring Expense**
Administration and management	$15,000	$1,000
Maintenance		$2,500
Monitoring $	2,500	$2,500
Special equipment, facilities, or improvements	$120,000	
Totals	$137,500	6,000

Anticipated Impacts of the Use(s):

The refuge wildlife-dependent uses being evaluated (wildlife observation, photography, and interpretation) will impose some negative impacts on specific physical resources such as trails and on natural resources such as wildlife and vegetation. Impacts may include erosion, deterioration, trampling, and disturbance.

Wildlife Observation:

Physical and habitat alteration: The impact of these activities depends upon the size of the group(s), the season of use, the location within the Public Use Area on Matia and Turn Islands, and the duration of the activity. These two islands receive heavy use for four months of the year with very little use the rest of the year. The potential exists for a maximum of approximately 100 visitors on each island at any one time, although this would be a rare occurrence. The construction and maintenance of visitor use facilities (i.e., trails, observation points, interpretive sites, composting toilets, and picnic tables) would have some effect on soils, vegetation, and possibly hydrology in specific areas. This could potentially increase

erosion and cause localized soil compaction (Liddle 1975); reduced seed emergence (Cole and Landres1995); alteration of vegetative structure and composition; and sediment loading (Cole and Marion 1988). The fact that the islands receive very little use for 8 months of the year ameliorates these impacts.

Human disturbance - general: The presence of people observing or photographing wildlife will also cause some impact to wildlife. Numerous studies have confirmed that people on foot can cause a variety of disturbance reactions in wildlife, including flushing or displacement (Erwin 1989; Fraser et al. 1985; Freddy 1986), heart rate increases (MacArthur et al. 1982), altered foraging patterns (Burger and Gochfeld, 1991), and even, in some cases, diminished reproductive success (Boyle and Samson 1985). These studies and others have shown that the severity of the effects depends upon the distance to the disturbance and its duration, frequency, predictability, and visibility to wildlife (Knight and Cole 1991). The variables found to have the greatest influence on wildlife behavior are a) the distance from the animal to the disturbance, and b) the duration of the disturbance. Animals show greater flight response to humans moving unpredictably than to humans following a distinct path (Gabrielsen and Smith 1995). Short-term and immediate responses to disturbance are fairly simple to document. A question that has received less research attention is whether these short term responses, which generally require increased energetic expenditures on the part of the individual, ultimately diminish an individual or population's capacity to survive and breed successfully (fitness). Energetic demands of responding to disturbance events were measured by Belanger and Bedard (1989). In Quebec, they found that if disturbance was severe enough to cause geese to fly and not resume feeding upon alighting, hourly energy expenditure increased by 3.4%; hourly metabolized energy intake decreased by 2.9 to 19.4%. A 32% increase in nighttime feeding was required to restore the energy losses incurred.

Effect of disturbance intensity: Some researchers have attempted to correlate disturbance events in wildlife to the intensity, proximity, or loudness of human disturbance. Burger (1986), studying shorebirds on an eastern coastal refuge, found that the level of disturbance in the shorebirds increased (fewer remained, more flew) as the total number of disturbances and the number of children, joggers, people walking, dogs, aircraft, and boats increased, and the duration of the disturbance and distance from the disturbance decreased.

Effect of human proximity: Other researchers have looked at the question of proximity. At what distance do humans on foot elicit a disturbance response? From an examination of the available studies, it appears that the distance varies dramatically from species to species. Burger and Gochfeld (1991) found that sanderlings foraged less during the day and more during the night as the number of people within 100 m increased. Elk in Yellowstone National Park were disturbed when people were at average distances of 573 m (Cassirer 1990). These elk temporarily left the drainage and their home range core areas and moved to higher elevations, steeper slopes, and closer to forested areas. Average return time to the drainage was 2 days. Erwin [1989] studied colonial wading and seabirds in Virginia and North Carolina. Mixed colonies of common terns-black skimmers responded at the greatest distances, with respective means of 142 and 130m; mixed wading bird species were more reluctant to flush (30-50 m average). There were few statistically significant relationships between flushing distance and colony size. Similarly, there were few differences between responses during incubation compared to post-hatching periods.

An analysis of over 4,000 human activity events near bald eagle nests in Central Arizona (Grubb and King 1991) found distance to disturbance to be the most important classifier of bald eagle response, followed in decreasing order of discriminatory value by duration of disturbance, visibility, number of units per event, position relative to affected eagle, and sound.

Breeding bald eagles in north-central Minnesota (Fraser et al. 1985) flushed at an average distance of 476 m at the approach of a pedestrian. A multiple regression model including number of previous disturbances, date, and time of day, explained 82% of the variability in flush distance and predicted a maximum flush distance at the first disturbance of 503 m (SE=131). Skagen (1980), also studying bald

eagles in northwest Washington, found a statistically significant decrease in the proportion of eagles feeding when human activity was present within 200 m of the feeding area in the previous 30 minutes. A statistically significant between-season variation occurred in the use of feeding areas relative to human presence, which correlated with food availability. Eagles appeared more tolerant of human activity in the season of low food availability.

In a review of several studies of the reaction of waterfowl and other wetland birds to people on foot, distances greater than 100 meters in general did not result in a behavioral response (DeLong 2002).

Effects on migrant birds versus resident birds: Klein (1989) studied the effect of visitation on migrant and resident waterbirds at Ding Darling National Wildlife Refuge, finding that resident birds were less sensitive to human disturbance than migrants. Migrant ducks were particularly sensitive when they first arrived on site in the fall. They usually remained more than 80 m from [a visitor footpath on a dike], even at very low visitor-levels. Herons, egrets, brown pelicans, and anhingas were most likely to habituate to humans, thus exposing them to direct disturbance as they fed on or near the dike. Shorebirds showed intermediate sensitivity. Strauss (1990) observed piping plover chicks spent less time feeding (50% versus 91%) and spent more time running (33% versus 2%), fighting with other chicks (4% versus 0.1%), and standing alert (9% versus 0.1%) when pedestrians or moving vehicles were closer than 100 m than when they were undisturbed. In addition, plover chicks spent less time out on the feeding flats (8% versus 97%) and more time up in the grass (66% versus 0.1%) during periods of human disturbance.

Wildlife Photography:
Wildlife photography is likely more disturbing, per instance, than wildlife observation. Klein (1993) observed at Ding Darling NWR, that of all the non-consumptive uses, photographers were the most likely to attempt close contact with birds, and that even slow approach by photographers disrupted waterbirds.

Dwyer and Tanner (1992) noted that wildlife habituate best to disturbance that is somewhat predictable or "background." Investigating 111 nests of sandhill cranes in Florida, Dwyer and Tanner found that nesting cranes seemed to habituate to certain forms of human disturbance and nested within 400 m of highways, railroads, and mines; cranes also were tolerant of helicopter flyovers. Even so, investigator visits to nests and development-induced alterations of surface water drainage were implicated in 24% of the nest failures.

Interpretation:
Enhanced interpretation will take place on-refuge on Matia and Turn Islands and consist of panels placed at strategic locations. Three interpretive panels will be installed on Matia Island. One panel will be placed at the Rolfe Cove access area; one approximately 100 feet west at the west end of the campground; and one at the Wilderness Trail trailhead. On Turn Island, three larger panels will be installed: one at the main access area, one approximately 150 feet southeast in the campground area, and one approximately 200 feet east at eastern trailhead. In addition, up to five additional smaller panels will be placed along the island trail at key interpretive locations. None of these panels will be located in close proximity to each other. Localized effects could include limited vegetation trampling and compaction of soils at these locations as the visiting public gathers to study the panels.

Summary:
All of the uses described occur in specific footprints on the refuge – Matia and Turn Island trails, access areas, and associated beaches. Estimated current use of less than 18,000 visits per year (Washington State Parks monthly attendance reports) does cause adverse effects, however. The fact that all uses are confined to a limited number of areas means that overall impacts are not extensive nor do they impact the greater part of the refuge. Interpretive panels are sufficiently spaced so as not to congregate use and impacts. Most use is during the summer months with very little use occurring in the spring and winter, allowing for some revegetation.

Access from points other than Rolfe Cove on Matia Island have resulted in illegal spur trails. This has resulted in vegetation trampling, deterioration, and some erosion, particularly coming from pocket beaches on the west, south, and east sides of the island. Replacement of three informational/regulatory signs and installation of three additional signs at these access points is expected to curb this use.

The Turn Island trail has been developed from a social trail that follows the perimeter of the island. This has resulted in the trail being located in a sensitive meadow area where tramping of vegetation occurs. In addition, there are two steep trails leading up from a beach area that have resulted in erosion. Although these impacts are short-term in the meadow area and long-term at the beach access, they can be remediated through rerouting of the trail around sensitive areas, interpreting the sensitivity of these areas with interpretive panels, and closure and rehabilitation of beach access trails.

The most heavily used areas around the composting toilets and picnic tables result in severely trampled or complete absence of vegetation with some erosion. This may also occur at interpretive sites when they are established. These areas make up approximately 1% of the total Turn and Matia Islands' acreage. The trampling at picnic table sites can be remediated by periodically moving the tables to new locations, however the toilet locations are fixed.

Public Review and Comment:

Public review and comment on this compatibility determination occured in conjunction with the release of the Draft CCP/WSP/EA.

Determination: (check one below)

___ Use is Not Compatible

_X_ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

User stipulations:

- Visitors will be required to access islands only at designated access points/areas, thus reducing potential for wildlife disturbance and establishment of illegal trails.
- Visitors will be required to stay on legally established, trails thus limiting the amount of area on the islands where impacts may take place.
- Use is restricted to daylight hours outside of camping area.

Administrative stipulations:

- Directional, informational, and interpretive signs will be posted and maintained to help keep visitors on trails and help educate the public on minimizing wildlife and habitat disturbance.
- Monitor impacts to wildlife, vegetation, and soil and employ adaptive management when needed. Management responses may include such actions as moving picnic tables and interpretive panels to new locations, rerouting island trails, and rehabilitation of impacted sites.
- Promote the "Leave No Trace" philosophy. At least 75 % of the refuge will be managed as wildlife sanctuary, free from routine disturbance.

Justification:

Specific areas in the San Juan Islands National Wildlife Refuge (trails and access areas on Matia and Turn Islands) have been designated for these uses. These areas will be monitored periodically for impacts that

would degrade the natural environment specific management actions would be implemented if impacts reached unacceptable levels. Wildlife observation, photography, and interpretation are three of the six wildlife-dependent recreational uses of the National Wildlife Refuge System as stated in the National Wildlife Refuge System Administration Act, as amended. Wildlife observation, photography, and interpretation through interpretive panels provide an excellent forum for increasing public understanding of the refuge's natural resources. By limiting these activities to a small percentage of the refuge and by providing wildlife sanctuary from human disturbance in other areas of the refuge, these programs will not interfere with the refuge achieving its purpose to "facilitate the management of migratory birds for which the United States has a responsibility under international treaties and to further effectuate the purposes of the Migratory Bird Conservation Act" and with regard to all by five acres of Matia Island "…to secure for the American people of present and future generations the benefits of an enduring resource of wilderness." These activities are used throughout the country to inform and educate visitors to public lands. (Grater1976).

Given the scale of the activity, the stipulations outlined above, as well as the best management practices identified, potential impacts relative to wildlife/human interactions will be minimal. The opportunity to engage in several priority public uses provided would outweigh any anticipated negative impacts associated with implementation of the program.

With the stipulations noted, access trails, interpretive panels, and information/regulatory signs activities will be compatible with Refuge purposes, while providing opportunities for visitors to use and learn about Refuge and marine resources. Thus allowing the priority public uses in this determination will not materially interfere with or detract from the fulfillment of the National Wildlife Refuge System mission or the purposes of this Refuge.

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Mandatory 10- or 15-Year Re-evaluation Date: (provide month and year for "allowed" uses only)

____X___Mandatory 15-year reevaluation date (for wildlife-dependent public uses)

_____ Mandatory 10-year reevaluation date (for all uses other than wildlife-dependent public uses)

NEPA Compliance for Refuge Use Decision: (check one below)

_____ Categorical Exclusion without Environmental Action Statement

_____ Categorical Exclusion and Environmental Action Statement

__X__ Environmental Assessment and Finding of No Significant Impact

_____ Environmental Impact Statement and Record of Decision

Signatures approving and concurring with Compatibility Determination for Wildlife Observation, Photography, and Interpretation on San Juan Islands NWR (Use is compatible with stipulations)

Refuge Determination

Refuge Manager/
Project Leader
Approval: _____ (Signature) 9/27/2010 (Date)

Concurrence

Refuge Supervisor: _____ (Signature) 9/27/2010 (Date)

Regional Chief, National
Wildlife Refuge System: _____ (Signature) 9/27/10 (Date)

Compatibility Determination

Use: Camping

Refuge Name: San Juan Islands National Wildlife Refuge

City/County and State: San Juan County, Island County, and Skagit County, Washington

Refuge Purposes and Establishing/Acquisition Authorities:

". . . reserved under jurisdiction of the Bureau of Sport Fisheries and Wildlife, United States Fish and Wildlife Service. . ." (all lands, PLO 2249).

". . .facilitate the management of migratory birds for which the United States has a responsibility under international treaties and to further effectuate the purposes of the Migratory Bird Conservation Act." (all lands, Proposal published in 38 FR 29831 on Oct 29, 1973 prior to PLO 5515, 1975)

"as a preserve, breeding ground and winter sanctuary for native birds." (Smith and Minor Islands, E.O. 1959 of 1914)

". . .to secure for the American people of present and future generations the benefits of an enduring resource of wilderness" (353 acres, all units of the refuge except for Smith, Minor, Turn, and a 5 acre portion of Matia Island, P.L. 94-557 of October 1976 and P.L. 88-577, the Wilderness Act of 1964.)

"lighthouse purposes." Navigation aids maintained under the jurisdiction of the U.S. Coast Guard (~19 units, Executive Orders from 1854 and 1875).

National Wildlife Refuge System Mission:

"The mission of the System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee]).

Description of Use:

Matia and Turn Islands are uniquely managed as National Wildlife Refuges and Washington State Marine Parks through an agreement between the Service and the Washington State Parks and Recreation Commission (WSPRC). The Service first entered into a long-term agreement with WSPRC in 1959 in response to uncontrolled public uses which created littering and sanitation problems on refuge lands. Washington State Parks established and maintains facilities needed for day use and overnight camping to support wildlife-dependent recreation at designated areas on Matia and Turn Islands. They also provide information to refuge visitors and enforce regulations.

Under the CCP, there would be 8 campsites on Turn Island and 6 campsites on Matia Island; camping would be limited to visitors arriving by human-powered watercraft. Motor powered vessels have greater flexibility to safely travel to other adjacent State Marine Parks. Changes to the camping program would be phased in as soon as practical.

On Matia Island, facilities include 6 primitive campsites, a kiosk, pay station, seasonal dock, composting toilet, picnic tables, and some signage in an approximately 2-acre area adjacent to Rolfe Cove. This area is outside the designated wilderness which encompasses most of Matia Island. On Turn Island, none of which is wilderness, facilities located on the southwest side of the island would include 8 (instead of the current 13) primitive campsites, two composting toilets, picnic tables, kiosk, two pay stations, and some signage. Camping is allowed year-round, however, most occurs from April through September. The heaviest camping usage is expected to continue to be during June, July, and August with most campsites occupied on weekends and many weekdays during much of this time. Camping fees are charged and collected by WSPRC.

Because the majority of the San Juan Islands NWR is closed to the public, Matia and Turn Islands offer a nonpareil opportunity to the visiting public to observe island wildlife and learn about and experience various island habitats. With this in mind, the Service plans to expand its interpretation on these two islands to enhance visitors', including campers', knowledge, enjoyment, and stewardship of wildlife and habitats within the San Juan Islands Refuge and all of the Salish Sea. Interpretive panels will be installed at strategic locations on the islands including the campground area. Matia Island will have one panel at the Rolfe Cove access point, one at the wilderness trailhead, and one at the west end of the campground. Turn will have three large interpretive panels: one located at the main access point, one east of the camping area at trail head, and one in the camping area. In addition there will be up to five small panels placed at various locations along the trail sufficiently spaced as to not concentrate use.

Availability of Resources:

Current staffing and budget is sufficient to monitor use periodically during the summer camping season. Washington State Parks maintains all of the facilities associated with camping and performs law enforcement duties, enforcing all state park regulations and the laws of the State of Washington. If, for any reason, State Parks decides to terminate the MOU and the Service wishes to retain camping and associated facilities, existing refuge resources will not be adequate to administer the program.

Category	One-time ($)	Annual ($/yr)
Administration and management	$1,000	$1,000
Maintenance	$0	$750
Monitoring	$0	$2,500
Totals	$1,000	$4,250

Anticipated Impacts of the Use:

The presence of humans on Turn and Matia Islands displaces some wildlife species and is an attractant to others. Marine mammals, seabirds, and black oystercatchers will avoid areas where people are frequently present and engaging in activities such as landing boats and camping. They are displaced to other areas with less human disturbance, including closed islands within the San Juan Islands NWR. Ravens and raccoons, on the other hand, are attracted to places where people camp and eat because they often have easy access to food. Ravens and raccoons also prey on the eggs and young of native passerine birds. When raven and raccoon numbers increase due to human activities, predation on native birds likely increases as well. Wildlife found on Turn and Matia Islands are likely to experience more incidents of human disturbance in general which can distract them from resting, foraging, and caring for their young.

These negative impacts are considered acceptable because of the presence of "sanctuary" areas on the San Juan Island NWR where seabirds, shorebirds, marine mammals, and other wildlife can go to avoid human disturbance. Allowing camping on Turn and Matia Islands also provides the opportunity to educate visitors and increase their appreciation and stewardship of marine wildlife. This would benefit wildlife throughout the refuge and Salish Sea.

Camping results in some vegetation trampling, soil compaction, and localized denuding of vegetation at campsites and where people concentrate. Enhanced enforcement is expected to decrease unauthorized camping outside of designated campsites. We may also initiate a reservation system to help reduce unauthorized camping. Limiting night use of the island to authorized campers only would also decrease the extremely heavy use of the island during popular weekends and holidays such as Independence Day. This along with 5 fewer campsites (8 instead of 13) on Turn Island would allow vegetation and soils to recover in those areas. Encouraging people to use liquid fuel campstoves and enforcing the "no open fires" regulation would minimize unauthorized wood collecting and cutting. This would retain more down wood and driftwood, which are important wildlife habitat components. Enforcement of "no open fires" would also reduce the risk of an open fire escaping and burning refuge habitats. Even after decades of being popular camping areas, the majority of habitats on Turn and Matia islands are in very good condition. The impacts of camping are found on just a few acres and should continue to be controllable within acceptable limits into the future with changes to the program

Public Review and Comment:

Public review and comment on this compatibility determination occured in conjunction with the release of the Draft CCP/WSP/EA.

Determination:

___ Use is Not Compatible

_X_ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

User stipulations:

- Only visitors arriving by human-powered watercraft are authorized to camp.
- All commercial operators wishing to use Turn and Matia campgrounds (e.g., kayak tour guides) must obtain a special use permit and have a copy in their possession while occupying refuge lands.
- Camping is limited to designated campsites. For example, camping is prohibited on closed shorelines.
- Overnight use of refuge limited to authorized campers with a maximum of 8 people per campsite.
- Fires (cooking or camp) are not permitted. Liquid fuel stoves only permitted.
- Pets are not allowed on refuge lands at any time.

Administrative stipulations:

- There are sufficient staff and funding resources available within WSPRC and/or the Service to maintain the facilities associated with camping (composting toilets, campsite markers, etc.) and administer the program.
- Refuge personnel will monitor campsite use and should they find non-compliance in numbers of campers per site, camping in unauthorized locations, or campsite use resulting in unacceptable

adverse effects to refuge resources, additional campsite modifications, including a campsite reservation system, may be necessary in order to continue to allow camping to occur on these islands.

- Campers feel safe on refuge lands and the number of reported unsafe incidents and undesirable behaviors is minimal

Justification:

This camping program facilitates and supports the priority public uses of wildlife observation, photography, interpretation, and environmental education both on-refuge as well as off-refuge. Allowing limited camping use offers a nonpareil opportunity to the visiting public to observe refuge wildlife and learn about and experience various island habitats at times when animals are particularly active, such as dawn and dusk, and to listen to the sounds of wildlife at night. Wildlife observation and photography in particular are very popular activities throughout the San Juan Archipelago. Many of the closed refuge islands within the San Juan Islands Refuge are popular for wildlife observation at a distance from a boat. Because human-powered watercraft are slower than motorboats, allowing these visitors to camp on Turn and Matia Islands facilitates their opportunity to travel greater distances to observe and photograph wildlife throughout the San Juan Archipelago, including other refuge islands.

Camping allows visitors arriving by human-powered watercraft to find safe haven to rest, and if necessary, to allow wind and inclement weather to abate. Matia Island is at the extreme northeast end of the San Juan Archipelago and takes many hours to reach by human-powered watercraft. Providing camping allows these users sufficient time to enjoy the refuge's wildlife-dependent recreation once they arrive. Camping on Turn Island allows visitors in the central portion of the San Juan Islands Archipelago a similar opportunity. Distances to adjacent safe harbor camping locations from Turn Island vary from approximately 6 nautical miles to the north to 3 ½ nautical miles to the south.

Given the scale of camping, the stipulations outlined above, as well as best management practices identified, potential impacts relative to wildlife/human interactions are expected to be minimal. By limiting camping to two small areas within the 83 island refuge, the opportunity to engage in several priority public uses provided through camping would outweigh any anticipated negative impacts associated with implementation of the program. Thus allowing camping to occur in the circumstances described above will not materially interfere with the purpose for which the refuge was established or the Mission of the National Wildlife Refuge System.

Mandatory 10- or 15-Year Re-evaluation Date: (provide month and year for "allowed" uses only)

_____ Mandatory 15-year reevaluation date (for wildlife-dependent public uses)

__X__ Mandatory 10-year reevaluation date (for all uses other than wildlife-dependent public uses

NEPA Compliance for Refuge Use Decision: (check one below)

_____ Categorical Exclusion without Environmental Action Statement

_____ Categorical Exclusion and Environmental Action Statement

__X__ Environmental Assessment and Finding of No Significant Impact

_____ Environmental Impact Statement and Record of Decision

Signatures approving and concurring with Compatibility Determination for Camping on San Juan Islands NWR (Use is compatible with stipulations)

Refuge Determination

Refuge Manager/
Project Leader
Approval: _____ (Signature) 9/27/2010 (Date)

Concurrence

Refuge Supervisor: _____ (Signature) 9/27/2010 (Date)

Regional Chief, National
Wildlife Refuge System: _____ (Signature) 9/27/10 (Date)

Appendix K. CCP Team Members, Public Involvement, and Compliance

CCP Team Members

The CCP was developed and prepared primarily by a core team made up of refuge and regional office staff. There was some turnover of refuge staff core team members during the planning process. The core team sought technical expertise from other professionals both within and outside the Fish and Wildlife Service throughout the CCP process. Portions of the document were researched and written with the assistance of a contracting firm, SWCA environmental consultations. The List of Preparers below includes the core team members as well as other persons responsible for writing specific portions of the plan. Many others provided assistance in developing and reviewing the CCP and associated products and in providing advice throughout the planning process. These people are captured in the List of Reviewers and Advisors.

List of Preparers

Name and title	CCP Contributions
Kevin Ryan, Project Leader	Decision-making and document quality reviewer; public involvement and communications plan lead; researcher/writer, compatibility determinations, implementation, compliance with NEPA, ESA, NHPA, etc.; Federal and State agencies, and Tribal coordination.
Jane Bardolf , Conservation Planner	CCP Team Leader responsible for regional office coordination and process and policy guidance for development of the CCP; CCP schedule and status reports; team meeting facilitator; document layout, management, and review; planning record; refuge purposes research; public involvement: public meetings, communications plan, and scoping report.
Lorenz Sollmann, Deputy Project Leader	Writer/reviewer: biological goals and objectives, affected environment and environmental consequences, contaminants, integrated pest management plan; research/analysis: invasive species, fire management, and habitat restoration; public involvement.
Sue Thomas, Refuge Biologist	Writer/reviewer: biological goals and objectives, affected environment and environmental consequences; climate change; research/analysis: habitats, wildlife, biological integrity, diversity, and environmental health; public involvement including outreach to local area and seabird biologists and managers.
Dave Falzetti, Refuge Officer and Visitor Services Manager	Writer/reviewer: visitor services goals and objectives, affected environment and environmental consequences; sign inventory and maintenance plans; research/analysis: appropriateness findings and compatibility determinations; public involvement including planning updates.
Khemarith So, Geographer	Development of working, public involvement, and document maps; GIS data gathering and analysis; researcher/writer: habitats and vegetation, rare plants and plant communities, climate change; San Juan Island unit descriptions and photographs: public involvement meetings.
Pam Sanguinetti, former Refuge Biological Tech.	Researcher/writer: preliminary biological goals, objectives, and biological environment, refuge vision statements; research/analysis: habitats, wildlife; communications plan and public involvement including planning updates.

Name and title	CCP Contributions
Staci McCorkle, Natural Res. Scientist, SWCA Env. Consultants	Researcher/writer/editor: physical environment, regional recreation, socioeconomics, and environmental consequences; public involvement: communication plan, scoping comments compilation, and public meetings.
James Feldman, Environmental Planner, SWCA Env. Consultants	Researcher/writer: socioeconomic environmental consequences
Virginia Parks, Archeologist	Researcher/writer: cultural resources objectives, affected environment, and environmental consequences.
Jory Clark, Archeologist	Researcher/writer: paleontological resources objectives, affected environment, and environmental consequences.
Nicole Garner, Writer/editor	Technical edit review of Draft CCP/WSP/EA and final stand-alone CCP/WSP document. Writing and editing of Federal Register Notices; Design and editing of planning updates.
Sue Mayo, Administrative Assistant	Researcher/writer: list of common and scientific species names, San Juan Island descriptions; abbreviations and glossary; CCP mailing list
Annette de Knijf, former Deputy Project Leader	Writer: refuge vision statements; research/analysis: contaminants, rare plants, county plans
Kay Kier-Haggenjos, Writer/editor	Technical edit review of Federal Register notices; design and edit of planning updates; review and edit of Draft CCP/WSP/EA.
Pat Stark, Visitor Services	CCP cover design and print management
Chris Columbus, Maintenance Technician	Public involvement: field trip transportation

List of Reviewers and Advisors

Name and title	CCP Contributions
Robyn Thorson, Regional Director	Final decision-maker, CCP/EA and Federal Register notice approvals
Carolyn Bohan, Regional Chief of Refuges	Major decisions on CCP direction, CCP/EA and Federal Register notice approvals
Forrest Cameron, Refuge Supervisor	Refuge workload assistance; reviewer; decision-maker
Linda Watters, former Assistant Refuge Supervisor	Refuge workload assistance; reviewer; decision-maker
Chuck Houghten, Division Chief,Refuge Planning	CCP Advisor for planning policy and guidance; reviewer; coordination with other divisions and WO.
Scott McCarthy, Branch Chief, Planning	CCP Advisor for planning policy and guidance; Planning workload priorities; coordination with other divisions.
Mike Marxen, Branch Chief, Visitor Services	Visitor Services review and guidance design, public use goals and objectives; public involvement assistance, CD review
Matt Hasti, Visitor Services	Visitor Services adviceand field trip
Ben Harrison, Division Chief, Natural and Cultural Resources	CCP Advisor, wilderness review, policy, appropriateness findings, compatibility determinations, environmental consequences review
Fred Paveglio, Branch Chief, Refuge Biology	Development and review of biological goals and

Name and title	CCP Contributions
	objectives and biological integrity, diversity, and environmental health analysis
Kevin Kilbride, Wildlife Biologist/ Regional IPM Coordinator	Development and review of biological goals and objectives and biological integrity, diversity, and environmental health analysis
Joe Engler, Wildlife Biologist/Wilderness Coordinator	Review of wilderness stewardship plan, wilderness reviews, and minimum requirements analyses
Cathy Sheppard, Division Chief, Realty and Refuge Information	Advice on realty issues; CCP Review
Georgia Shirilla, former Branch Chief, Refuge Acquisition	Advice on realty issues; CCP review
David Patte, ARD, External Affairs	Communications plan review, assistance with tribal coordination meetings
Joan Jewett, External Affairs	News release review and distribution
Scott Aikin, Tribal Liaison	Identification of Tribes in the planning area, tribal coordination planning
Pat Gonzales-Rogers, Tribal Liason	Coordination with Tribes
Maura Naughton, Seabird Biologist	Advice on seabirds and development of biological goals
Greg Hagedorn, District Fire Management Officer	Advice on fire management

Public Involvement

Public involvement was sought throughout the development of the Draft CCP. During initial scoping, summer of 2007 to April of 2008, outreach efforts emphasized face-to-face meetings with key state and Federal agencies, marine resource committees, federally elected officials, tribal governments, and the research community. After initial public scoping, preliminary management options were presented at two public open house meetings and additional agency coordination occurred. The Service also distributed two planning updates, initiated news releases, and gave presentations at community and other non-government organizations to inform the public, invite discussion and solicit feedback. Below is a brief summary of the meetings and other outreach tools that were used in our public involvement efforts.

Federally Elected Officials or their Aides

- March 13, 2008, Port Angeles, WA. Met with Judith Morris, Aide to Congressman Norm Dicks, 6th District
- March 6, 2008, Bellingham, WA. Met with Cherie Little, Aide to Congressman Rick Larson, 2nd District
- March 4, 2008, Federal Building, Seattle, WA. Met with Ardis Dumett, Aide to Senator Patty Murray
- April 4, 2008, Federal Building, Seattle, WA. Met with Christine Endersen-State Director; Sally Hintz –NW WA Director; and Michael English from Senator Maria Cantwell's office.

- August 9, 2010. Federal Building, Seattle, WA. Met with Sheila Babb, Deputy State Director for Senator Patty Murray and Nancy Biery, State Outreach Director for Senator Maria Cantwell
- August 11, 2010, Everett, WA. Met with Adam LeMieux, Aide to Congressman Rick Larson, 2nd District .
- August 25, 2010, Washington Maritime NWRC Headquarters, Sequim, WA. Met with staff from Senator Maria Cantwell's Office.

Tribal Governments

In July 2007, letters were sent to representatives of 14 federally recognized Tribes associated with the Refuges' 2 treaty areas. The letters invited the tribes to participate in the CCP process and to attend their choice of 2 meetings:

- August 15, 2007, in Mount Vernon, WA
- August 16, 2007, in Quilcene, WA.

Follow up calls were made to encourage their participation. No tribes attended these meetings and no comments from tribal representatives were received before, during, or after these two meetings. A follow-up letter asking if the Tribes wished to participate in the planning process and/or had comments to send us was sent along with Planning Update #1 during the first week of October 2007. Planning Update #2 and #3 were also sent to the Tribes in August 2008 and 2010 respectively. Some tribal representatives have attended Marine Resource Committee and Northwest Straits Commission meetings (see below) when the CCP was being discussed.

State Agency Representatives

Washington Department of Fish and Wildlife, Region 6, Coastal Washington

- October 16, 2007, Montesano, WA. Met with Regional Director and District Wildlife Biologist
- July 2008, Field trip to Protection Island with District Wildlife Biologist

Washington Department of Fish and Wildlife Region 4, North Puget Sound

- October 22, 2007, Mill Creek, WA. Met with Regional Director, Wildlife Program Manager, District Biologist and 5 other biologists.

Washington Department of Fish and Wildlife Headquarters

- November 1, 2007, Olympia, WA. Statewide FWS CCP coordination meeting, met with Don Kraege, Dave Brittell, and several others.
- September 16, 2009, Olympia, WA. Statewide FWS CCP coordination meeting, met with Don Kraege and several others.
- June and July 2010. Additional phone and e-mail communications with Don Kraege.

Washington Department of Natural Resources

- November 16, 2007, Seattle, WA. Met with Dave Roberts, Assistant Regional Manager; Larry Dominguez, Stewardship Program; Kyle Murphy, Aquatic Reserve Program: Terry Carton, San Juan District.
- July11, 2008, Sedro Woolley, WA. Met with Dave Roberts.

Washington State Parks, Northwest Regional Office

- November 27, 2007, Burlington, WA. Met with Terry Doran, NW Regional Director, Jim Neill; Supervisor to the San Juan Islands; Dave Castor, Ranger/Manager to Matia Island area.
- July 11, 2008, Burlington, WA. Met with Eric Watilo, NW Regional Director, and Jim Neill.
- July 17, 2008, Field trip to San Juan Islands with Jim Neill to review visitor services.
- October 16, 2009, Burlington, WA. Met with Jim Neill.
- June-Sept, 2010, Additional phone and e-mail communications with Eric Watilo and Jim Neill.

Federal Agency Representatives

NOAA/NMFS, Office of Protected Resources

- November 16, 2007, Seattle, WA. Met with Donna Darm, Assistant Regional Director and Brent Noberg, Marine Mammal Coordinator

USCG, 13th District Aids to Navigation

- January 24, 2008, Seattle, WA. Met with Lieutenant Commander Matthew Walker; Seaton; John Moriarty; John Barberi.

Marine Resource Committees (MRC) and Northwest Straits Commission

Jefferson County MRC

- June 5, 2007. Briefly introduced CCP at regular MRC meeting.
- June 9, 2007. Gave boat tour of Protection Island to 2 boat loads (~12 people).
- October 2, 2007. Gave presentation about CCP at regular MRC meeting of approximately 16 MRC members, guests, and staff.

Clallam County MRC

- February 11, 2008, Port Angeles, WA. Met with approximately 20 people to discuss proposed aquatic reserve around Protection Island.

Island County MRC

- November 6, 2007, Coupeville, WA. Gave presentation about CCP at regular MRC meeting with 9 MRC members and 1 State Parks staff.

Skagit County MRC

- October 11, 2007, Anacortes, WA. Gave presentation about CCP at regular MRC meeting with 20 MRC members, guests, and staff.

San Juan County MRC

- October 17, 2007, Friday Harbor, WA. Gave presentation about CCP at regular MRC meeting with 19 MRC members, guests, and staff.
- May 18, 2009, Friday Harbor, WA. Gave brief update of CCP at Marine managers Workshop.

Northwest Straits Commission

- January 25, 2008, Jamestown S'Klallam Tribal Office, Sequim, WA. Gave presentation about CCP at regular meeting with Ginny Broadhurst and 2 others from Northwest Straits Commission, Kathy Fletcher of Puget Sound Initiative, one person from each of the 7 MRCs and a few others.

Research Community

Researchers Focus Groups

- December 6, 2007, Washington Maritime NWRC, Port Angeles, WA. Met with WA Department of Fish and Wildlife Researchers Scott Pearson and Steve Jeffries.
- December 6, 2007, Washington Maritime NWRC, Port Angeles, WA. Met with Julia Parrish, professor at UW; Scott Pearson,WDFW; Peter Hodum, professor at University of Puget Sound; Tom Good, NOAA Fisheries.
- March 21, 2008. Met with Jim Hayward, Andrews University; Joe Galusha, Walla Walla College; Shandelle Henson, Andrews University.
- September 3, 2009. Conference call with seabird professionals to gather information and advice regarding deer impacts on seabird nesting islands. Twelve participants representing FWS from other refuges and the migratory birds program, US Geological Survey, Washington Dept. of Fish and Wildlife, University of Washington, University of Puget Sound, Andrews University, The Nature Conservancy, and Parks Canada.
- September 3, 2009. Call with Ulrich Wilson, former Refuge Biologist.
- June 9, 2010. Met with researchers conducting operations on Protection Island and/or San Juan Islands NWR on Protection Island and gave short briefing on status of CCP and range of alternatives. Participants included Scott Pearson (WDFW), Tom Good (NOAA), Peter Hodum (U of Puget Sound), and Jim Hayward and Shandelle Henson (Andrews U).

Conferences

- Georgia Basin Puget Sound Research Conference, March 25-29, 2007, Vancouver, BC, Canada. Refuge biological technician gave a poster presentation about CCP planning issues and invited participants to sign up for the CPP mailing list. Audience included Canadian and U.S. scientific and conservation community interested in Puget Sound including government and tribal representatives.
- Pacific Seabird Conference, February 27- March 1, 2008. Refuge biological technician gave a poster presentation about CCP planning issues and invited participants to sign up for the CPP mailing list. Audience included people interested in seabirds, including state and federal agency staff; university professors and students; and many others.

Non-government Organizations

- *The Nature Conservancy* – Washington Field Office, Seattle WA, January 26, 2007. Met to discuss early CCP planning issues and species of concern. Additional informal coordination throughout 2007 and 2008 to share information regarding native plant communities especially in the San Juans.
- *Admiralty Audubon Society*, Port Townsend, WA, January 17, 2008. Gave CCP presentation at regularly scheduled meeting with approximately 30 Audubon members and guests. Additional coordination August 2008 with chapter founder Eleanor Stopps.
- *Peninsula College,* Museum and Arts Center, Sequim, WA, February 15, 2008. Gave CCP presentation to approximately 30 students and instructors.

- *Kiwanis Club,* Port Townsend, WA, November 21, 2008. Gave CCP presentation to 35-40 Kiwanis Club members.

Public Open House Sessions

September 23, 2008, Mullis Community Center, Friday Harbor, WA
Presented preliminary management options and took comments

September 24, 2008, Fort Worden State Park, Port Townsend, WA
Presented preliminary management options and took comments

U.S. Fish and Wildlife Service Coordination

The core planning team coordinates frequently among themselves during the planning process. The core team also relies on specialists from various Service programs for their expertise. Additional coordination occurs with the Regional Office Management and the Washington Office at key phases in the process including:

Washington Office briefings
- Scoping briefing statement - April 28, 2008
- Alternatives briefing statement - March 23, 2009

R1, Pacific Regional Office Management Reviews
- Preplanning Briefing meeting - March 13, 2007
- Alternative Briefing meeting - June 3, 2008
- Administrative draft Briefing meeting - March 10, 2010

Planning Updates

A mailing list of approximately 500 persons and organizations is maintained at the Refuge and was used to distribute planning updates. Additional hardcopy planning updates were provided to refuge office visitors, handed out or available at meetings, available at libraries, and mailed to additional interested parties. Electronic copies are posted and available for downloading on the Service's Region 1 planning website.

1. October 2007– Background information on the refuges, preliminary issues and goals, and initiation of public scoping, including a mail-in comment form.
2. August 2008 – Results of initial scoping, preliminary management options, invitation to public open house meetings, and opportunity to comment on management options.
3. August 2010 – Announces release of Draft CCP/WSP/EA,summary of CCP alternatives, invites public to comment on the Draft document

4. Expected March 2011 – Announce decision and availability of CCP, summary of comments on Draft CCP and changes to the plan.

Media Outreach and Press Coverage

Refuge staff sent news releases to local media contacts and made follow-up calls to maximize the likelihood of press coverage. News releases were also electronically sent to Service's Region 1 list of nearly 400 regional and WA state media contacts and were posted on the Service's Region 1 Website. Press coverage included the following:

News release #1: Initial Scoping, September-October 2007
- October 3, 2007. The Islands' Sounder.
- October 10, 2007. Port Townsend & Jefferson County Leader
- October 11, 2007. Peninsula Daily News
- February 8, 2008. Whidbey Examiner

News release #2: Preliminary Management Options, August-Sept 2008
- August 24, 2008. Peninsula Daily News
- September 17, 2008. Journal of the San Juans

News release #3: Draft CCP/WSP/EA – August 2010
- September 1, 2010. Port Townsend & Jefferson County Leader

Federal Register Notices

- Notice of Intent to prepare a Comprehensive Conservation Plan and Environmental Assessment published - August 14, 2007
- Notice of Availability of a Draft Comprehensive Conservation Plan and Environmental Assessment published - August 18, 2010
- Notice of Decision and Availability of the Comprehensive Conservation Plan – Expected March 2011

Additional Outreach Tools Used

- A one-page flyer was produced to announce the planning process and let people know where to get more information and where to send their comments. This was posted in August 2008 at many State Marine Parks including Turn, Matia, and Jones; at The Whale Museum in Friday Harbor; at the Port Townsend Marine Science Center; and other locations where both summer visitors and residents were likely to see it.
- Partners including SoundWatch, and State Parks assisted in getting messages out through their normal venues regarding CCP public meetings and opportunities to comment.

STATEMENT OF COMPLIANCE
for Implementation of Protection Island and San Juan Islands National Wildlife Refuges Comprehensive Conservation Plan and San Juan Islands Wilderness Stewardship Plan Jefferson, Clallam, Island, Skagit, and San Juan Counties, Washington

The following executive orders and legislative acts have been reviewed as they apply to implementation of Protection Island and San Juan Islands National Wildlife Refuges Comprehensive Conservation Plan and San Juan Islands Wilderness Stewardship Plan.

National Environmental Policy Act (1969). The planning process has been conducted in accordance with National Environmental Policy Act Implementing Procedures, Department of the Interior and Service procedures, and has been performed in coordination with the affected public. The requirements of the National Environmental Policy Act (42 U.S.C. '4321 et seq.) and its implementing regulations in 40 CFR Parts 1500-1508 have been satisfied in the procedures used to reach this decision. These procedures included the development of a range of alternatives for the CCP; analysis of the likely effects of each alternative; and public involvement throughout the planning process.

An environmental assessment (EA) was prepared for the project that integrated the CCP management objectives and alternatives into the NEPA document and process. The Draft CCP and EA were released for a 30-day public comment period. The public was notified of the availability of these documents through a Federal Register notice, news releases to local newspapers, the Service's refuge planning website, and a planning update. Copies of the Draft CCP/EA and/or planning updates were distributed to an extensive mailing list. The CCP was revised based on public comment received on the draft documents.

National Historic Preservation Act (1966). The Service will continue to uphold the National Historic Preservation Act during implementation of the CCP. If any management actions have the potential to affect any historic properties, an inventory will be conducted as necessary and appropriate actions to mitigate effects will be identified prior to implementation of the project.

Executive Order 12372. Intergovernmental Review. Coordination and consultation with affected Tribal, local and State governments, other Federal agencies, and the landowners has been completed through personal contact by Service Planners, Refuge Managers, and Supervisors.

Executive Order 13175. Consultation and Coordination with Indian Tribal Governments. As required under Secretary of the Interior Order 3206, American Indian Tribal Rights, Federal-Tribal Responsibilities, and the Endangered Species Act, the Project Leader and Regional Office staff informed the 14 Federally recognized tribes associated with the refuges planning area about the planning process and provided opportunities for participation and commenting on the proposed action. Specifically, the Service invited Tribes to two coordination meetings during initial scoping, made phone calls, sent planning updates, and provided other CCP-related materials throughout the Service's planning process during development of the Comprehensive Conservation Plan.

Executive Order 12898. Federal Actions to Address Environmental Justice in Minority and Low-Income Populations. All Federal actions must address and identify, as appropriate, disproportionally high and adverse human health or environmental effects of its programs, policies, and activities on minority populations, low-income populations, and Indian Tribes in the United States. The CCP was evaluated and no adverse human health or environmental effects were identified for minority or low-income populations, Indian Tribes, or anyone else.

Wilderness Act (1964). The San Juan Islands Wilderness area, which includes 353 acres within the San Juan Islands NWR, was established in 1976 under Public law 94-557. The only parts of this refuge that are not designated wilderness are Smith and Minor Islands, Turn Island, and a small portion of Matia Island. This CCP is also the updated San Juan Islands Wilderness Stewardship Plan. Protection Island NWR and the portions of San Juan Islands NWR that are not already designated wilderness were evaluated for suitability as wilderness. These areas were determined to not be suitable due to their altered nature, presence of structures, and/or strong evidence of humans.

A Minimum Requirement Analysis (MRA) was prepared for research, monitoring, and management, and another MRA was prepared for signs management within the San Juan Islands Wilderness Area. These were prepared in a manner consistent with the Wilderness Act of 1964 (16 U.S.C. 1131-1136). The MRAs clarify the need for and determine the potential impacts of a proposed action to wilderness resources. The Service will authorize an activity within designated wilderness only if it is demonstrated that the activity meets the minimum requirement for administering the area as wilderness and accomplishes the purposes for which the refuge was established, including Wilderness Act purposes.

National Wildlife Refuge System Administration Act of 1966, as amended by The National Wildlife Refuge System Improvement Act of 1997 (16 U.S.C. 668dd-668ee). During the CCP process the Refuge Manager evaluated all existing and proposed refuge uses on Protection Island and San Juan Islands Refuges. Priority wildlife-dependent uses (hunting, fishing, wildlife observation and photography, environmental education and interpretation) are considered automatically appropriate under Service policy and thus exempt from appropriate uses review. Appropriate Use Findings have been prepared for the following uses: research, camping, and pets. Research and camping were found to be appropriate but pets were not appropriate. Compatibility determinations have been prepared for the following uses: wildlife observation and photography, and interpretation; environmental education; research; and camping. All of these uses were found to be compatible with Refuge purposes and the System mission with stipulations specified in each of the compatibility determinations.

EO 13186. Responsibilities of Federal Agencies to Protect Migratory Birds. The CCP is consistent with Executive Order 13186 because the CCP and NEPA analyses evaluate the effects of agency actions on migratory birds. Implementation of the CCP is expected to enhance conditions for migratory birds on the Refuges.

Endangered Species Act. This Act provides for the conservation of threatened and endangered species of fish, wildlife, and plants by federal actions and by encouraging the establishment of state programs. Section 7 of the Act requires consultation before initiating projects which affect or may affect endangered species. The only federally threatened or endangered species known to occur on the refuges is the Steller sea lion. Marbled murrelets are not found on refuge islands but forage in the waters near the San Juan Islands NWR. Consultation for Steller sea lion research conducted on refuge lands is covered by NOAA as part of their ongoing multi-state research program. The most recent biological opinion for Steller sea lion and northern fur seal research activities on the west coast, including Washington, is dated June 2007. Other research and monitoring activities conducted by refuge staff or partners avoid going near areas where Steller sea lions reside and therefore should not affect them or their habitat. Law enforcement and educational activities aimed at reducing human disturbance to refuge wildlife including T&E species will maintain a low human disturbance environment on and near the refuges. If any research, monitoring, or management actions have the potential to affect Steller sea lions or marbled murrelets, they will be the subject of separate Endangered Species Act (ESA) section 7 consultations prior to commencement.

Coastal Zone Management Act, Section 307. Section 307(c)(1) of the Coastal Zone Management Act of 1972, as amended, requires each Federal agency conducting or supporting activities directly affecting the coastal zone to conduct or support those activities in a manner which is, to the maximum extent practicable, consistent with approved state coastal management programs. The implementation of the Protection Island and San Juan Islands NWRs CCP is consistent with the Coastal Zone Management Act.

Executive Order 11990. Protection of Wetlands. The CCP is consistent with Executive Order 11990 because CCP implementation would protect and potentially enhance existing wetlands.

Integrated Pest Management (Service Manual 569 FW 1)
In accordance with this Service policy, the CCP has adopted an integrated pest management approach to eradicate, control, or contain pest and invasive species on the refuges. Only pesticides registered with the US Environmental Protection Agency (USEPA) in full compliance with the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), and as provided in regulations, orders, or permits issued by USEPA, may be applied on lands and waters under refuge jurisdiction.

Scott McGarity
Chief, Refuge Planning Branch

9/27/10
Date

Appendix L. Public Comments and Service Responses

In this appendix the Service responds to comments that were received on the Protection Island and San Juan Islands National Wildlife Refuges Draft Comprehensive Conservation Plan, Draft Wilderness Stewardship Plan, and Environmental Assessment (Draft CCP/WSP/EA, August 2010) during the official public comment period from August 13-September 17, 2010. Comments were received via letter, e-mail, and phone. All substantial comments regarding the Draft CCP are presented below. Some comments have been paraphrased because they were received over the phone or because paraphrasing enhanced the context and clarity of the comment. Some comments have had formatting changes and other minor edits to correct spelling or punctuation, but the majority of comments are as received. Service responses indicate where changes were made to the CCP based on specific comments.

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Comments and Responses

1. Washington Department of Fish and Wildlife

Comment: The Washington Department of Fish and Wildlife (WDFW) has reviewed the Draft Comprehensive Conservation Plan, Draft Wilderness Stewardship Plan, and Environmental Assessment (Plans/EA) for the Protection Island and San Juan Islands National Wildlife Refuges. In general, we agree with the preferred alternative (Alternative B) outlined in the document. Our comments are mainly centered on the portions of the DCCP dealing with the Protection Island National Wildlife Refuge (PINWR).

We believe that the highest priorities for management at PINWR should be control of nonnative invasive plants and animals, in conjunction with seabird conservation and protection. In most cases, the Plans/EA align with these priorities. Additional work needs to be completed to determine impacts of native species on other species and habitats before impacts can be assumed. Several objectives seek to "reduce impacts from other native predators (e.g. coyote, raccoon, mink, and river otter)" on seabirds; however, these impacts have not been quantified or evaluated (as noted in Strategies section). As stated in previous correspondence, we are supportive of deer control on the refuge, but some impacts are overstated in the Plans/EA (e.g., references to fallow deer in New Zealand). WDFW would like to be involved in future assessments and development of control options for all native species on the refuge.

Service Response: Thank you for reviewing and commenting on the Draft CCP. We appreciate your support for the preferred Alternative and non-native invasive species control. We agree that work would need to be done to assess impacts of native predators on seabirds and many strategies in Chapter 2, section 2.5, Objectives 1.1, 1.2, 1.3, 2.1, 2.2, 3.1,3.2,3.3, 4.1, and 4.2 all state that surveys will be conducted, impacts determined, and if necessary, a management plan developed before any action would take place. Thank you for your support of deer removal on this important seabird island. Known impacts from ungulates including the fallow deer example in New Zealand were provided to show potential impacts from a high density of ungulates on confined island habitats. In particular, the analogy from New Zealand was intended to provide an example of the impacts of extreme overgrazing that has been published in the literature. It was not meant as a direct comparison. Based on your comment and in order to avoid giving readers the impression that we are overstating impacts, the New Zealand reference has been removed. We look forward to working with WDFW in the development of assessments and control options for native species on the refuge.

Comment: We urge USFWS to be cautious in the application of habitat management techniques on PINWR. Controlled burns were proposed as management tool on the spits, but it is not clear what the fire frequencies and importance to these types of habitats were historically. Introducing fire could bring other unexpected environmental consequences. In addition, restoration of plant communities on the bluffs at this point seems to be premature, and seeding the bluffs needs to done with an understanding of the

impacts it could have on seabirds. Also, we have found that the management and restoration of savanna and bald habitats to be extremely expensive and labor intensive, with limited success.

Service Response: The Service agrees that even partial restoration of native plant communities on Protection Island needs to be done cautiously. The Service will test a number of restoration techniques including prescribed fire and assess their success and impacts on small test plots prior to expanding them to larger areas. Restoration on the bluffs would be done even more cautiously. To avoid damaging seabird burrows or increasing erosion from people and equipment, restoration techniques on the slopes may be limited to aerial over-seeding with native perennials. Perennials would assist in soil stabilization compared to the non-native annual grasses that currently predominate. While restoration of savanna and bald habitats will surely present challenges, the Service feels that the effort will be worth it even if only small acreages of this scarce habitat type are restored.

Comment: The public education and viewing opportunities sections for PINWR could be expanded. Reader boards or videos on the ferries are a start, but there are many additional educational or appreciative opportunities for PINWR. There is mention of ecotourism but the concept is not truly integrated into the plan. The private sector could be used to a greater extent and PINWR could facilitate the marketing of wildlife viewing opportunities associated with the refuge. People will pay to be educated and the refuge will have greater public involvement and appreciation of the resources present.

We appreciate the opportunity to comment on the Plans/EA for these unique National Wildlife Refuges, and look forward to future involvement in the cooperative management of these shared resources.

Service Response: The Service agrees that there are many ways to increase wildlife viewing and educational opportunities related to Protection Island NWR. Additional strategies such as those you mentioned can be added over the life of the CCP as long as they are consistent with achieving our objectives. We are very careful about what we allow to occur on and/or near Protection Island due to the sensitive nature of the wildlife that relies on the island, its shoreline, and the surrounding waters for nesting, resting, foraging, and access to the island and its resources. In Chapter 2 under Goal 6, we have two objectives (6.4 and 6.5) that address educational activities that focus on stewardship and environmental studies on Protection Island NWR. Under Goal 7 we have many objectives and strategies for off-refuge opportunities for viewing, photographing, interpreting refuge wildlife as well as community outreach and environmental education. The Service also collaborates with Port Townsend Marin Science Center which offers wildlife viewing boat tours around Protection Island (See Appendix G). We would like to do more to promote responsible wildlife viewing and educational opportunities than we are doing now and feel that the above identified objectives reflect that. Even increased collaboration with others such as conservation organizations and private ecotourism businesses requires adequate staffing. We are hopeful that we will have adequate staffing and funding to be able to provide more wildlife viewing, photography, interpretation and education opportunities to the public over the next 15 years.

2. Point No Point Treaty Council
Tim Cullinan

Comment: The Point No Point Treaty Council (PNPTC) appreciates the opportunity to comment on the U.S. Fish and Wildlife Service's Draft Comprehensive Conservation Plan (CCP), Wilderness Stewardship Plan, and Environmental Assessment for the Protection Island and San Juan Islands National Wildlife Refuges. The PNPTC is a natural resource management organization formed in 1974 to serve the Port Gamble S'Klallam and Jamestown S'Klallam Tribes to fulfill the requirements placed upon them by the U.S. Supreme Court in U.S. v. Washington (the "Boldt Decision"). The Treaty Council confirms the

reserved rights established in the 1855 Treaty of Point No Point and implements goals set by member Tribes for resource conservation, management, and the protection of Treaty Rights.

The draft CCP appears solidly grounded in conservation biology and contains a thorough summary of existing knowledge. We have nothing to add regarding the population status or management needs of the species addressed in the plan. The plan clearly describes its primary strategies and objectives for protecting and managing the featured species and their habitats.

Service Response: Thank you for reviewing and commenting on the Draft CCP. We appreciate your professional support of the conservation biology and the management needs addressed in the plan.

Comment: On the other hand, we have identified a major oversight in your implementation strategy for the CCP. As currently written, the Preferred Alternative states an objective to eliminate the detrimental impacts of black-tailed deer on seabirds on Protection Island. To achieve this, the Plan proposes to lethally remove deer from Protection Island "in coordination with the Washington Department of Fish and Wildlife." Throughout the Goals, Objectives, and Strategies section of the CCP (Section 2.5), the document repeatedly states the objective to "work with WDFW to remove deer from Protection Island."

On behalf of our member Tribes, the Jamestown S'Klallam and the Port Gamble S'Klallam, we are writing to notify the U.S. Fish and Wildlife Service that it is not sufficient to merely involve the Washington Department of Fish and Wildlife in the management of deer on Protection Island. Under federal law, the Jamestown and Port Gamble S'Klallam Tribes are recognized as co-managers of wildlife resources in the territory ceded to the United States in the 1855 Treaty of Point No Point. Protection Island lies within that ceded area. As co-managers, the S'Klallam Tribes are entitled to an equal voice in management decisions with the WDFW.

Service Response: The Service recognizes that Protection Island is in the area ceded through and associated with the Treaty of Point No Point of 1855. There are four Federally recognized tribes associated with this treaty: Jamestown S'Klallam; Port Gambel S'Klallam; Lower Elwha Klallam; and Skokomish (hereafter collectively referred to as Treaty Tribes). Based on the definitions of co-management and cooperative management in the Service's Native American Policy, we view the Tribes as cooperative managers while the Service carries the burden of legal responsibility associated with ownership and management of Protection Island National Wildlife Refuge. The Service recognizes that there are similarities between our relationship with the State and our relationship with Tribes. We also recognize that there are some differences particularly regarding Protection Island. The Washington Department of Fish and Wildlife (WDFW) retains ownership of 48 acres on the west end of Protection Island known as the Zella Schultz Seabird Sanctuary. The Service has had an ongoing relationship with WDFW since the refuge was established and we have a Memorandum of Understanding (MOU) for cooperation between the Service and WDFW regarding Protection Island. Recognizing the cooperative management role of the Treaty Tribes, the Service would welcome the opportunity to partner with Treaty Tribes for the protection of refuge resources and areas of mutual interest.

Comment: The black-tailed deer has always been one of the most important terrestrial game species to the S'Klallam people. Deer historically provided the raw material for food, clothing, tools, weapons, and ceremonial artifacts. When the S'Klallam Tribes ratified the Treaty in 1855, they retained their right to hunt in their usual and accustomed places and on open and unclaimed lands. Today deer remain a resource of immense economic and cultural value. The S'Klallam people continue to exercise their treaty rights by hunting deer to meet their ceremonial and subsistence needs.

Service Response: The Service appreciates the economic and cultural value of deer to the Tribes. In the CCP the Service is making the decision to remove deer from Protection Island but has not decided on the exact methods to be used. A "step-down" plan will be prepared to determine details associated with removal. Defining the application of treaty rights is outside the scope of this CCP. We are not attempting

to resolve those treaty rights (e.g., hunting) whose application to national wildlife refuges has not been legally defined. We do not intend to enlarge or diminish treaty rights or to otherwise resolve un-adjudicated treaty rights through this CCP. However, recognizing the importance of deer to Treaty Tribes and the Tribes' cooperative management role, the Service is committed to engaging interested Treaty Tribes during the step-down planning process for deer removal.

Comment: As you may know, the PNPTC and the S'Klallam Tribes maintain our own wildlife management programs independent of (but in collaboration with) Washington State. We establish our own seasons and regulations. To hunt deer, Tribal hunters must be licensed and be in possession of big-game permits. They must report all harvest, and are subject to firearms and public safety rules that are at least as stringent as those that apply to hunters licensed by the State. The Tribes employ a professional wildlife biologist and professional enforcement personnel to implement our wildlife management programs. Involvement of the S'Klallam Tribes in implementation of the CCP will yield mutual benefits. At present, it is not certain that Washington State will be able to contribute sufficient resources to achieve your objectives. The State has trimmed its spending by $6 billion in the past 18 months, and on September 13, Governor Gregoire ordered State agencies to reduce spending by an additional seven percent. Given that the WDFW staff is already stretched to its limits, it is unlikely that the State will be able to provide all the assistance you will need to implement your plan. The S'Klallam Tribes, on the other hand, are in a position to make a significant contribution to your effort.

Service Response: We recognize that the PNPTC and the S'Klallam Tribes have professional wildlife management expertise and skilled Tribal hunters. We appreciate your willingness to use your resources to assist us in implementing the CCP.

Comment: It is important that you understand that we do not dispute, nor do we oppose, your conclusion that the detrimental impacts of black-tailed deer must be eliminated to achieve the goal of maintaining Protection Island's nesting seabirds and habitat. We insist, however, that in the implementation of the CCP, the S'Klallam Tribes be offered the opportunity to be part of the solution. Consequently, we urge you to revise your strategy and objectives for managing deer on Protection Island to include consultation and collaboration with the S'Klallam Tribes. We ask that in the final draft of the CCP, each reference to working with WDFW be revised to read: "work with WDFW *and the affected Treaty Tribes*…"

Service Response: We appreciate your support of the deer removal strategy for maintaining Protection Island's nesting seabird habitat. We have not yet determined which method(s) will be used to remove deer from Protection Island. As stated above, the Service is committed to coordinating with interested Treaty Tribes during the step-down planning process for deer removal. Therefore we have modified this strategy in the CCP from "Work with WDFW to remove deer from PI" to "Coordinate with WDFW and Treaty Tribes in the development of a step-down plan to remove deer from PI."

Comment: Thank you for your consideration of these comments. I will be in touch with you as the development of the CCP proceeds toward completion. The Jamestown S'Klallam and Port Gamble S'Klallam Tribes and the PNPTC look forward to regular and meaningful consultation and collaboration between the U.S. Fish and Wildlife Service and Tribal officials in the development of your policies that have implications affecting our Tribal resources and Treaty Rights.

Service Response: Thank you again for your interest in Protection Island and your willingness to collaborate with the Service on management issues. We look forward to developing a partnership with the Point No Point Treaty Council and the Treaty Tribes to assist with implementation of the CCP.

3. San Juan County Noxious Weed Control Program
Richard Lee and Judy Jackson

Comment: In reading the Draft CCP/WSP/EA Alternatives Summary Table for Protection Island and the San Juan Islands, we find, under "Scientific Assessment" (Alternatives B and C), "Conduct assessment of invasive wetland species," but no mention of control or eradication of those species, nor any mention of assessment or control of invasive species in the uplands. Under "Habitat Management," we find no mention of control or eradication of noxious weeds or other invasive non-native vegetation. Control of selected noxious weeds is required by Washington State law (RCW17.10 et al.).

Service Response: Thank you for your interest and for taking the time to review the Draft CCP for Protection Island and San Juan Islands NWRs. We share your concerns regarding the assessment and control of noxious and invasive weeds on our islands. These invaders compete with and alter the habitat needed by native plants and wildlife. In the Draft CCP/WSP/EA Chapter 2 Alternatives Summary Table for Habitat Management, Multiple Habitats, Alternative A, the last bullet states "Survey and use integrated pest management strategies on invasive species,.. ." This management action applies to the other alternatives as well, which is indicated under Alternatives B and C by the statement "Same as Alt A., plus:..." Additionally, invasive species and their management are mentioned in many other places in the Draft CCP/WSP/EA document, including Chapter 1 section 1.9 Issues; Chapter 2, section 2.3.1, Features Common to All Alternatives; Section 2.5 Goals, Objectives, and Strategies, especially under Goals 1-5 we have many strategies to survey, control, and/or eradicate invasive species; Chapter 4 Refuge Biology and Habitats talks about invasive species in several places, especially in section 4.1.6 Influx of Exotic, Invasive, and Other Species of Management Concern; and in Chapter 6 Environmental Consequences, invasive species are mentioned. There is also a large CCP Appendix (E) that is the Integrated Pest Management Program for the refuges which addresses invasive plants and animals, and monitoring for invasive species is included in Appendix G Implementation. Based on your comment we added "upland" to the last bullet under Scientific Assessments, Alternative B (which also applies to Alternative C) in the Alternative Summary Table, and we added a strategy in Chapter 2, Goal 9, Objective 9.3 which states "Conduct surveys and assessments of invasive upland and wetland plants."

Comment: While we are not familiar with vegetation surveys on these islands, we are aware of problems with lawnweed (*Soliva sessilis*), spurge laurel (*Daphne laureola*), Scotch broom (*Cytisus scoparius*) and other noxious weeds on similar islands under state ownership. We feel that it is of paramount importance to not only conduct assessments, but also to control or eradicate noxious weeds and other invasive non-native vegetation on these islands. Any delay in the removal of these species will only increase the severity of their effects on island ecosystems.

Service Response: We are aware of the potential threat to refuge habitats from lawnweed, spurge laurel, and scotch broom. These species are listed within the Integrated Pest Management Program in Appendix E. Scotch broom was removed from one of our islands several years ago, but currently none of these species are known to occur on refuge islands. We have been removing English ivy and English holly from Turn and Matia Islands within the San Juan Island NWR in the past few seasons. Considering the sensitivity of island habitats and resident wildlife we agree with you regarding the importance of both conducting surveys and controlling or eradicating invasive plants as quickly as possible. In the CCP we identified the need for strategies to clean equipment and use quarantine methods if necessary to proactively prevent invasions (See Chapter 2, section 2.5 Goals, Objectives and Strategies, Goals 1-6 and 9). Similarly, we have also noted throughout the CCP the importance of partnering with others. We would welcome the opportunity to partner with county weed control offices such as yours to achieve mutual objectives to prevent, survey for, control, and eradicate noxious and invasive weeds.

4. San Juan County Marine Resources Committee
Mary Knackstedt and Steve Revella

Comment: This letter is sent to express the San Juan Marine Resources Committee's support for the USFWS draft Comprehensive Conservation Plan for the Protection Island and San Juan Islands National Wildlife Refuges. The CCP is well researched and well written and we value being listed as a partner in its implementation. We appreciate the USFWS use of the San Juan Marine Stewardship Area Plan in its development.

In particular, we support the following elements of the preferred Alternative B in the plan:

- We strongly support all actions to preserve native plants, birds, and other wildlife in the refuges. As the region grows to accommodate increased population and recreational activities, refuges will increasingly serve as repositories of native and rare species. As mentioned in the plan, restoration of host plant species in the refuges may be beneficial to re-establish or support rare species on adjacent islands that are not part of the refuge system.
- As one of the rarest and vulnerable ecosystems in the nation, we support increased protection, maintenance and restoration of savanna, grassland, and herbaceous bald patches on 28 islands in the San Juan Islands Refuge.
- In recognition that wildlife comes first in the refuges, we support the establishment of shoreline closures and buffer zones to reduce human disturbance. We support the proposal to restrict pets on all islands, only allow camping on Matia and Turn Islands to those in human-powered vessels and restricting access to sensitive areas on Turn Island.
- The objectives in Goal 6 of the CCP align well with the top ranking strategy in the San Juan Marine Stewardship Plan to foster a stewardship ethic. We would like to work with you to help educate residents and visitors about the natural and cultural resources of the region and increase awareness and foster stewardship for the natural resource legacy held in public trust in these refuges. We are interested in helping with the annual educational stewardship project described in objective 6.4.
- We believe it is critical to the success of the CCP to hire a Refuge Manager and other staff as needed to oversee the work in the San Juan Islands refuge. Staff that are stationed in the area are needed to spearhead the strategies, enforce protections, and observe and monitor conditions in the refuge.
- Federal, tribal, state, and local agencies and organizations that have management responsibilities and conduct research in the San Juan Islands will play a role in carrying out the CCP. Please let us know if the MRC's Marine Managers' Workshop would be a useful venue to distribute information or solicit input or partnerships as you carry out the plan.

Thank you for the opportunity to comment on the CCP. We look forward to working with you to carry it out.

Service Response: Thank you for reviewing, providing comments, and supporting the Service's preferred alternative. The Service has worked closely with the Marine Resource Committee on a number of issues, including drafting of the San Juan Marine Stewardship Plan. As a citizen advisory committee dedicated to the protection and restoration of marine resources in the San Juan Islands, the MRC has been an important partner with the Service in the management of refuge resources. The MRC's Marine Managers Workshop is an excellent venue for the Service to inform all interested publics on the status of implementation of the various components of the CCP. We look forward to continuing our relationship and the MRC's assistance in implementing the CCP.

5. The Nature Conservancy of Washington
Phil Green

Comment: Please accept the following comments on the USFWS draft CCP for Protection Island and the San Juan Islands National Wildlife Refuge. This is an excellent plan. If all parts of the preferred

alternative are implemented, it would greatly benefit the wildlife in the region. However, we realize that funding is limited so would like to highlight strategies in the plan that we think would have the greatest impact for the wildlife in the area in line with the mission of the USFWS and these two refuges in particular.

Coordinate with WDNR to establish appropriate shoreline buffers. This strategy is listed under Objective 1.3 (page 2-33) dealing with protecting and maintaining rocky shoreline and cliff habitats. Your rationale (page 2-34) clearly points out that the marine birds and mammals using these habitats are the winners with this strategy. TNC has worked with USFWS (page 5-17, G-12) in the Yellow and Low Island area (plus Nob Island). A 200-yard mandatory buffer around these islands would be very beneficial to the seabirds and mammals in this area as well as other SJINWR islands. Strategy l. for Objective 6.1 (page 2-49) calls for leases of tidelands for Matia and Turn Islands. Strategy g. for Objective 8.2 (page 2-57) calls for acquiring 'leases or withdrawals of tidelands and bedlands from WDNR to better control unauthorized access from intertidal areas.' We encourage the Service to work with WDNR to establish a mandatory buffer similar to the Protection Island aquatic lease for all feasible SJINWR islands.

Service Response: The Service is committed to working with WDNR and other partners to assist in protecting tidelands, bedlands, and limiting human-caused wildlife disturbance around all feasible refuge islands. These areas provide important feeding, resting, and breeding habitat for seabird, waterfowl, shorebirds, and marine mammals using the islands. Where mandatory buffers do not exist, we will educate the public on impacts to wildlife from human-caused disturbance and encourage them to participate in voluntarily honoring a buffer area.

Comment: *Work with WDFW to remove deer from Protection Island.* This strategy is listed under Objective 1.1 (page 2-30), Objective 2.1 (page 2-35), Objective 2.2 (page 2-37), Objective 3.1 (page 2-39), and Objective 4.1 (page 2-43). These objectives cover restoring spit habitat and burrow nesting seabird habitat, enhancing rhinoceros auklet and tufted puffin nesting habitat quality, restoring savanna, grassland, and herbaceous bald habitat, and restoring and maintaining forests and woodlands. Clearly the deer are having a negative impact on the island habitat in general and nesting seabird habitat in particular. We encourage the Service to make this one of their highest priorities.

Service Response: Thank you for your support. As shown by the Objectives you cite, the removal of deer from Protection Island to aid in restoration and enhancement of habitat is highly important to the Service and Refuge management.

Comment: *Continue to survey for the presence of non-native rats, rabbits, red foxes, feral cats and dogs, and use appropriate tools to maintain zero population levels.* This strategy is listed under Objective 1.1 (page 2-30), Objective 1.2 (page 2-32), Objective 1.3 (2-33), Objective 2.1 (page 2-35), Objective 2.2 (page 2-37), Objective 3.1 (page 2-39), Objective 3-2 (page 2-41), Objective 3.3 (page 2-42), Objective 4.1 (page 2-44), and Objective 4.2 (page 2-45). These nonnative mammals have negative impacts on both native flora and fauna as the range of objectives suggest. Zero population levels for all these species is a realistic goal and should be a top priority.

Service Response: The Service is particularly concerned with potential infestation of these non-native or feral animals and their impacts to Refuge resources. We will make it a priority to monitor and take corrective action if necessary.

Comment: *Objectives 6.1* (page 2-49) and **7.2** (page 2-53)**,** strategies e. and i. respectively, call for the creation of two new positions stationed in the San Juans: a full-time Refuge Manager and a seasonal ranger. To ensure the success of this CCP, these positions should be given a top priority.

Objective 9.1 (page 2-58), Management of the Research Program, focuses on making research more applicable to the refuges. Strategies a. and b., *Projects with high level of applicability to Refuge*

management or scientific knowledge needs and *establish a research committee to develop proposals to meet priority information needs identified by management* are both critical steps for the refuges to guide overall refuge management and add to the collection of scientific knowledge about refuge habitats and species.

The Nature Conservancy and USFWS have a long history of working together and TNC looks forward to helping make this CCP a success. Thank you for the opportunity to comment on the CCP and our compliments on a job well done.

Service Response: Again, thank you for your comments in support of the preferred alternative in the Draft CCP. The Service appreciates the long and beneficial relationship it has had with The Nature Conservancy and looks forward to its continuance and assistance in implementation of the final CCP.

6. Skagit Audubon Society
Timothy Manns

Comment: I am writing on behalf of Skagit Audubon Society to offer comments on the draft Comprehensive Conservation Plan, Wilderness Stewardship Plan, and Environmental Assessment for Protection Island and San Juan Islands National Wildlife Refuges. Thank you for sending us Planning Update 3 and the CD of the complete document. We appreciate the opportunity to study them and comment. We found these plans and the assessment full of information, making them both interesting and a useful reference on these two very important National Wildlife Refuges, their resources, and management. We appreciate the careful and thorough approach demonstrated throughout. We also appreciate the attention the document gives to the effects of global warming on the refuge's resources, the specific references to the scientific literature supporting options and decisions, and many other aspects of the plans. The text truly documents the quality and importance of the resources entrusted to the Fish & Wildlife Service with these islands, rocks, and reefs that are among most protected lands and shorelines in Puget Sound and the Straits. Because of its particular emphasis on protection and habitat restoration supplemented by education and interpretation, we strongly support the CCP Team Preferred Alternative B and offer the following comments.

Clearly, these two refuges are severely understaffed right now, even more so in light of what would be required to implement Alternative B. Skagit Audubon is eager to lend our support in any ways available to promote the increased staffing and funding described. We support additional research staff to enable a more comprehensive research and monitoring program, and more enforcement staff to address the current severe problem of trespassing on the islands and rocks closed to entry in order to protect wildlife (referenced on page 487, H-9). With an addition of visitor services/interpretive staff, it will be more feasible to engage the help of volunteers for such things as shoreline cleanup, mechanical eradication of exotic plants, interpretive work on and off-site, and citizen science for certain types of monitoring. We urge you to add Audubon Chapters (Skagit Audubon Society, Whidbey Audubon Society, North Cascades Audubon, Admiralty Audubon Society, and San Juan Island Audubon Society) and Washington State University Beach Watchers groups (organized by county in Skagit, San Juan, Island, Jefferson, and Clallam as well as others around Puget Sound) within the vicinity of the two refuges as sources of citizen science volunteers. To further place this plan in the context of Puget Sound environmental protection and restoration, it would be appropriate to also show Puget Sound Partnership and People for Puget Sound in the list of partner agencies and nongovernmental organizations.

Service Response: Thank you for your comments and suggestions for partners. We have added local Audubon Chapters, Washington State University Beach Watchers Program, Puget Sound Partnership, and People for Puget Sound to our list of Partnership Opportunities in Appendix G.

Comment: In the section of the plan dealing with education and interpretation, you might consider adding such communications media as short-range radio stations (as the 1606 stations used at some parks and elsewhere) and web sites with contact information included on signs designed for reading by people onboard boats approaching the islands closed to entry. The latter may be what is referred to on page 2-52 at Objective 7.1h: "Update and maintain refuge-specific websites that can be linked to additional technology." This would make it possible to provide on-the-spot interpretive information via radio and, for example, iphone about the resources being protected and the consequent reason that the great majority of the islands and rocks are closed to entry.

Service Response: The Service did not want to list all the "additional technology" in the strategies but short range radio stations are one of the technologies being considered. Information and interpretive signs will include website contact information as appropriate. We will also continue to use brochures, videos, and news releases, among other strategies, to educate and provide information to the public.

Comment: We agree with all the Refuge Goals found in section 1.11 (pages 1-16 & 17; PDF pages 24 & 25), which emphasize habitat protection and restoration for maximizing optimum species diversity and numbers and call for public education towards an understanding of the role of the Fish & Wildlife Service, personal reduction of impacts affecting the resources of the Salish Sea, protecting the wilderness character of the San Juan Islands Wilderness Area, and collecting scientific information to support the appropriate management of the refuges. We note that the draft plan calls for the reduction of the number of campsites on Turn Island, the closure of much of Turn Island's shoreline to landing, banning of dogs from both refuge islands (Turn and Matia) where they are currently allowed on leash, and other increased restrictions. We feel that the document provides strong justification for all these changes, and we support them. We note the careful and thorough wilderness analysis in the plan covering various proposed or existing activities within San Juan Islands Wilderness Area. We agree with the conclusions, including the Minimum Requirement and Minimum Tool analysis leading to the conclusion that motorized equipment may properly be used in installing "No Entry" and other signs in wilderness on many of the 83 islands, rocks, and reefs comprising San Juan Islands National Wildlife Refuge. We assume (and it may be explicitly stated in the plan) that the timing of the use of motorized equipment will be planned to avoid the presence of nesting birds or of hauled-out marine mammals.

We support an aggressive and thorough approach to removing any non-native mammals, all of which are clearly detrimental to ground and burrow-nesting seabirds. We also support the removal of deer from Protection Island, where their foraging and other activities adversely affect nesting Rhinoceros Auklets, Tufted Puffins, and Glaucous-winged Gulls. We note the statement that a detailed plan will be prepared before any native predators are removed should this be necessitated by their effects on the bird species which these refuges were established to protect. We assume there would be a public comment period for such a plan.

Service Response: Thank you for your support of our Refuge goals and the actions identified in our preferred alternative. The method(s) of removal of deer from Protection Island will be developed in collaboration with the Washington Department of Fish and Wildlife and Point No Point Treaty Tribes. If, during development of any detailed plan to remove native predators, it is found that anticipated effects are different from what has already been outlined in this document, then the Service will go through an additional planning process with appropriate public involvement.

Comment: We note on page 163 (4.41) under "4.8.6 Information Gaps/Research Questions" the item, "Is there additional high quality seabird nesting habitat worth protecting through acquisition or easement?" and on page 273 under "Habitat Protection Needs" as well as in regards to effects of sea level rise (global warming) this sentence: "Due to the scarcity of small islands suitable for nesting seabirds and other marine wildlife, their protection is warranted whenever possible. If other islands within the Salish Sea become available they would be evaluated for their conservation potential and considered for

inclusion into the Refuge System or another form of habitat protection." We urge the Fish & Wildlife Service to energetically pursue the goal stated here in cooperation with such organizations as The Nature Conservancy, The Trust for Public Land, and the relevant local Land Trusts (e.g., San Juan Preservation Trust, Skagit Land Trust, Whidbey-Camano Land Trust) if that would hasten the process of acquisition before development destroys more Puget Sound habitat.

Service Response: The Service acknowledges the importance of undisturbed island habitats to the wildlife of the San Juan Archipelago and the Salish Sea and is anxious to work with all partners in protecting these areas.

Comment: Preferred Alternative B calls for limiting commercial day-use groups on Matia Island to 20 people. At page 250 (6-18) the plan states, "Under Alternatives B and C, the wilderness experience on Matia Island is expected to be enhanced by limiting the size of commercial day use groups to not more than 20 people. This would increase opportunities for solitude or near solitude and decrease the noise that can accompany large groups." While the analogy is perhaps not directly relevant, we would note that in the Stephen Mather Wilderness (North Cascades National Park Service Complex), Glacier Peak Wilderness, Pasayten Wilderness, and other Wilderness Areas in the northern Cascades managed by the U.S. Forest Service, following a similar intent, group size on trails is limited to 12 with a limit of half that in nontrailed areas. We realize that commercial providers often want higher limits in order to achieve an economy of scale, but we suggest that this should not be a primary consideration in deciding group size limits in designated wilderness. Please consider reducing the 20-person group size limit in order to better assure a wilderness experience to group members and others in the area and to reduce the impacts on wildlife which larger groups are likely to have.

We appreciate the opportunity to comment and thank you for your work in the protection of these important parts of the public domain.

Service Response: We appreciate your concern for a quality wilderness experience for Island visitors. Through the life of the CCP, we will evaluate the effects on wildlife and habitat of the numbers of people in commercial day-use groups. Strategy (f) under Objective 8.2 Wilderness Experience has been modified to include monitoring impacts and reduce numbers if necessary.

7. The Whale Museum
Jenny Atkinson and Val Veirs

Comment: The Whale Museum would like to thank you for the opportunity to provide comments on the United States Fish and Wildlife Service's (USFWS) Protection Island and San Juan Islands National Wildlife Refuge Draft Comprehensive Conservation Plan, Draft Wilderness Stewardship Plan, and Environmental Assessment (Draft CCP/WSP/EA). We appreciate your efforts to explore a wide variety of options for the conservation management of some of the most diverse and special places within the Salish Sea and specifically within the San Juan Islands. Please accept the following comments on behalf of The Whale Museum.

The Whale Museum supports the Draft CCP/WSP/EA USFWS Preferred Alternative B. We applaud this management plan alternative because it places a high priority on natural and cultural resource management while also supporting continued opportunities for the public to develop a greater stewardship ethic for our refuge islands. The Whale Museum supports both the protection and restoration of quality habitats for seabirds and marine mammals, as well as expanded interpretation and educational programming on natural and cultural resources to help the public better understand the role of the National Wildlife Refuge System and learn how they can reduce their own impacts. The Whale Museum also appreciates the opportunities this management plan provides for increased scientific collection and

information to better understand the Salish Sea ecosystem and assist with better managing the Refuge system.

The Whale Museum commends the USFWS for taking an active role in managing the marine resources and adjoining uplands within the Refuge system. The Whale Museum is particularly supportive of management actions such as those that focus efforts to protect nearshore, tideland and bedland habitats, as they are critical in supporting both seabird and marine mammal populations, [and] also support forage fish, bottomfish and salmon populations that are important prey for the endangered population of Southern Resident Killer Whales. Partnering with local management agencies such as the San Juan County Marine Resources Committee is an excellent way to further mutual resource protection objectives. The Whale Museum is looking forward to continuing its excellent working relationship with the USFWS, and is especially excited to work with existing San Juan Islands National Wildlife Refuge staff and the proposed San Juan Island-based Refuge staff to help promote appropriate wildlife viewing opportunities, monitor public use and conduct marine wildlife surveys within the Refuge, as well as assist with marine stewardship interpretation and educational programming about the San Juan Islands and Protection Island Refuge.

We look forward to working with the wonderful Refuge staff and to the continued protection of the islands' natural and cultural resources that the Refuge system provides long in to the future.

Service Response: Thank you for reviewing and commenting on the Draft CCP. We appreciate your support of our Preferred Alternative B for management of the refuges. We share your concerns about restoring quality habitat for a variety of species that use the islands and look forward to continuing our partnership with The Whale Museum in implementation of the final CCP.

8. Michael Barry

Comment: I do not have enough time to read through 500+ pages, wish there was a summary document. Anyway I support the general management goals that I have read about for Protection Island and the San Juans that you propose.

Service Response: We agree that the Draft CCP/WSP/EA is a very large document. While we did not prepare a separate summary document, Chapter 2 of the Draft CCP/WSP/EA and Planning Update #3 provide a Summary of the Alternatives to give readers a good sense of what is included under each alternative in just a few pages. Thank you for taking time to review the Draft CCP/WSP/EA and for your support of the management goals for the Refuges..

Comment: The deer population should definitely be monitored. I am not sure how long they have been there; if they are native, the population should be managed and limited. If they are not native there, I support removal to protect the seabird nesting. If possible they should be removed alive and transported elsewhere, but I imagine costs and logistics do not allow that.

Service Response: A search of the historic records revealed that deer were first reported on Protection Island in the early 1990s. They are native and abundant in Washington State and the Service will work with WDFW and Treaty Tribes to assess viable options for deer removal through a separate step-down management planning process.

Comment: Strongly support native plant diversity emphasis. Public visitation needs to be managed and limited when minimal impact. I also encourage additional education and interpretive developments. Yes they cost $. Many of us support these refuges, yet we may never see them closely (do not have a boat or cannot afford the commercial cruises). It would be nice to have a booklet on each refuge on the flora,

fauna, ecology, and history. Also maybe consider some wildlife viewing cams if they do not have impacts.

Service Response: We agree and have identified the need to increase off-refuge education and interpretation because we realize refuge access is necessarily limited. Objective 7.1 lists 10 actions to meet that objective, including the development of refuge-specific brochures as an action for Alternatives B & C. Specifically, brochures will be developed to identify the species using the refuges, where to view them, their ecological needs, and ways to minimize human-caused disturbance. We appreciate your suggestion for installing wildlife viewing cams on Protection Island and will investigate feasibility and costs.

9. Kevin Bi

Comment: I am a 14-year-old first class scout from troop 582 in Kenmore, WA. My troop goes to Turn Island every summer to camp and kayak. And every time we have the time of our lives there. Turn Island is such a wonderful place: you can explore the island, swim in the Sound, kayak and cliff jump. From our time on Turn Island, we have gained experience that allows us to appreciate the beauty of nature and realize how lucky we are to have such a state park as well as a government that supports it. In addition, by spending time on Turn we gain respect for nature and try to preserve it as best we can. Turn Island is quite a paradise and microcosm.

Recently, I have read your brochure about your plans for the protection of the San Juan Islands concerning Turn and Matia Island. You gave three plans where plan A was to "continue as it is", plan B was to "limit island use to man-powered boats only", and plan C was to "forbid overnight camping on the island". The brochure also stated that the preferred plan was B, which would prevent motor boats from going onto the island to camp. However during the last camping trip to Turn island (from August 11-August 18), we learned that if motor boats were prohibited from going to Turn island, the revenue produced by the few man-powered boaters would not be enough to support sending a ranger to the island, therefore causing the eventual loss of camping on the island. So if plan B was to be carried out it would eventually have plan C's outcome.

Service Response: Thank you for reading the draft comprehensive conservation plan and for your comments. The Service believes input from Refuge users provides valuable insight and is critical to developing an effective management plan. Turn Island is not a "state park" but rather is part of a National Wildlife Refuge and as such has an inherently different purpose. The Island is managed by the U.S. Fish and Wildlife Service (Service). The camping area and associated facilities are provided, managed, and maintained by the Washington State Parks and Recreation Commission (WSPRC) under a Memorandum of Understanding with the Service.

The Service met with WSPRC officials during the development of the draft CCP while addressing public uses, including camping, and their appropriateness and compatibility with the Refuge's enabling legislation and purposes. Discussions resulted in the proposal set out in alternative B, the Service's preferred alternative. The WSPRC supports the preferred alternative and has reiterated their willingness to continue the partnership with the Service on public uses which includes maintaining camping facilities on Matia and Turn Islands with these new stipulations.

Comment: My preferred plan would be plan A: continue with "current management." With both human-powered and man-powered boats [sic] being able to camp on the island, the rangers' department would have enough revenue to keep a ranger at Turn Island. I also hope that you do not employ plan C because camping on Turn Island is extremely enjoyable, there are trails people can hike on, you can conveniently dock kayaks or boats, and it gives a spectacular view during the sunset. It seems that everybody who camps on Turn Island enjoys it. Prohibiting camping would also be depriving the public of a terrific

camping site and eliminating a place for people to enjoy the great outdoors. Please go with plan A and continue with "current management".

Service Response: The National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57) recognizes that refuges are set aside for "wildlife first" while at the same time identifying compatible wildlife-dependent recreational uses as the priority general public uses of the Refuge System. These uses must be compatible with, and appropriate to, the specific refuge's purpose and can include hunting, fishing, wildlife observation, photography, environmental education, and interpretation. Because camping in itself is not identified as a wildlife-dependent public use, continuing the activity "as is", Alternative A, is not a viable option.

However, the Service felt that with some modifications to the current program, camping could be made compatible and appropriate in support of wildlife observation, photography, and interpretation. Because human-powered watercraft are slower than motorboats, allowing these visitors to camp on Turn Island facilitates their opportunity to safely reach the Island and have sufficient time to enjoy the Refuge's wildlife-dependent recreation without having to depart in time to reach alternate accommodations. Motorboats, on the other hand, have greater ability to safely travel in a short period of time to adjacent campground areas on islands that are not national wildlife refuges.. Under the preferred alternative, visitors arriving by motor and sail power would have access to the Island during the day and could still camp on their boats while secured to the mooring buoys provided by the Washington State Parks and Recreation Commission.

10. Sheila Bishop

Comment: I love your preferred Alternative B plan for the San Juan Islands National Wildlife Refuges with its increased signage. I am a homeowner on south end of Lopez Island. I have made the comment to you before that any island without signage is getting plenty of human and even dog visitation.

Service Response: Thank you for reviewing and commenting on the draft CCP for Protection Island and San Juan Islands National Wildlife Refuges and for your support of the preferred alternative (B).

The Service recognizes the need for better signage in the San Juan Islands NWR. Chapter 2, Objective 8.1, Alternative B, proposes creating a series of specialized signs to be used on Refuge islands (larger sizes with text specific to island environments). The larger formats would allow bigger text readable by the unaided eye at greater distances. The text would be changed from the Service standard "Area Beyond This Sign Closed" to "Island Closed, No Entry". This would allow boaters to learn that the islands are closed before they approach, thus facilitating compliance and encouraging a larger wildlife disturbance buffer. In addition, under Alternative B, Objective 6.1, strategy i, no dogs would be allowed on Matia or Turn Islands.

Comment: In fact, this year one of the local kayak guides began dropping her groups off on Aleck Rock twice a week or more. In addition, on Aleck Rock, I generally see at least 4 different visiting groups each week during the summer. That's quite a bit of traffic. I have also noticed the eagles do not visit Aleck Rock as much as in previous years—I think [this] must be due to the increased visitation.

The visitors are both boaters passing through thinking it looks like a fun place and not reading their charts about the wildlife refuge, and also the locals who like to hang out there, camping even. These generally are all law abiding people, just not informed. Well ok, I was a bit frustrated by the teenager a few years back rolling all the glacial erratic boulders he could manage into the ocean.

Service Response: The Service recognizes the challenge of minimizing wildlife disturbances while maintaining the wilderness character of the islands and realizes that it will take multiple strategies

including increased public education and enforcement, citizen involvement, and the judicious use of signs. Chapter 2, Objective 7.1 addresses area visitor awareness, 7.2 addresses community awareness including increased staffing and enforcement, and 7.3 addresses outreach specifically to the boating and aviation communities including working with NOAA to better identify Refuge Islands and disturbance buffers on nautical charts, meeting with boating groups such as the kayak guides you mention, and working with partners such as local citizens and organizations.

Comment: If you do put signs on Aleck Rock, I would encourage you to consider one on each side of the island as both are used as landing sites by boaters.

I am convinced that we humans have enough territory and we should leave at least a bit unmolested for the animals, insects, plants of our area.

Service Response: Because each island is unique, staff will consider a number of factors when locating signs, including wildlife usage, trespassing issues, proximity to vessel traffic, terrain, and possible landing/access sights. Many islands will need multiple signs such as you suggest for Aleck Rock.

11. Clark Casebolt

Comment: I am writing in regards to the planning process (Comprehensive Conservation Plan for Protection and San Juan Islands National Wildlife Refuges) currently being developed. I am specifically interested in plans A, B and C as they pertain, specifically, to Turn Island.

I should also mention that I am a commercial kayak outfitter. My company, Outdoor Odysseys, has been running kayak tours in the San Juan Islands for 23 years. Over the years we have used Turn Island for overnight (camping) use as well as a lunch and paddling break place. It is an amazing island with a variety of great attributes - and definitely one of the jewels within the San Juan Island Refuge system. In looking at the three Plans (A, B and C) my first preference is Plan A, i.e., the current management plan.

Service Response: Thank you for reading the draft comprehensive conservation plan and for your comments. The Service believes input from Refuge users provides valuable insight and is critical to developing an effective management plan. The Service also agrees that Turn Island is indeed a special place. Turn Island is part of the San Juan Islands National Wildlife Refuge and is managed by the U.S. Fish and Wildlife Service. The camping area and associated facilities are provided, managed, and maintained by the Washington State Parks and Recreation Commission (WSPRC) under a Memorandum of Understanding with the Service.

The National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57) recognizes that refuges are set aside for "wildlife first" while at the same time identifying compatible wildlife-dependent recreational uses as the priority general public uses of the Refuge System. These uses must be found to be compatible and can include hunting, fishing, wildlife observation, photography, environmental education, and interpretation. Because camping in itself is not identified as a wildlife dependent public use, continuing the activity "as is", Alternative A, is not a viable option.

Comment: My hesitation in endorsing Plan B (my second choice and your preferred option) is the reduction in the number of sites available for camping and the initiation of a camping reservation system. As mentioned our company currently does not use Turn Island much except for lunch breaks. I could foresee a significant change in the use of Turn by commercial outfitters in the foreseeable future (2011) if NOAA follows through with their proposed half mile no boat zone off the west side of San Juan Island. If that occurs a number of San Juan outfitters that currently launch at San Juan County Park would be 'displaced' and would need to launch at either Jackson Beach or Turn Island County Park.

For the reasons stated above, my personal preference would be to see a continuation of Plan A - with Plan B as a second best option. If you have any questions or concerns please feel free to contact me.

Service Response: Federal regulations stipulate that any commercial use of refuge land requires the issuance of a permit. Outfitters should contact the Refuge Manager at 360-457-8451 to apply for permits.

The Service is proposing to remove 5 of 13 campsites on Turn Island. This will reduce the area of wildlife habitat disturbed from camping while still maintaining a quality experience by not stacking campers on top of each other. Within four miles of Turn Island there are 2 State Parks with 13 campsites and 2 county parks with 20 campsites. Currently there are more than 400 public camping sites and nearly as many private sites in the San Juan Islands. Removal of these 5 will result in an overall reduction in campsites of less than 1 %.

After further review, including discussions with Washington State Parks and Recreation Commission personnel, the Service is not proposing to implement a camping reservation system for Matia and Turn Island campgrounds at this time. However, Refuge and State Parks personnel will continue to monitor camp site use. Should they find non-compliance issues such as excessive numbers of campers per site, camping in unauthorized locations, or camp site use resulting in unacceptable adverse effects to Refuge resources, initiating additional camping modifications, including a camp site reservation system, may be necessary in order to continue allowing camping on these islands.

12. Colin Doherty

Comment: I am concerned that the management plans do not include protection of bottom fish. There should be no fishing zones around the NWRs. In some of BC's most productive intertidal regions (Kyoquot Sound, Bunsby Islands, Brooks Peninsula), the provincial parks also are marine conservation areas where fishing is closed. We need to do the same if we want our bottom fish to survive. The San Juans are the most productive marine waters in Washington, and we all want to keep it that way.

Service Response: While the Service shares your concern for bottom fish protection and recovery, it is outside the scope of our CCP. The CCP only addresses management of National Wildlife Refuge lands in San Juan Islands NWR. The waters around our islands are not part of the refuge and the Service does not manage the fishery resources. We would be pleased to work with WDFW and the Tribes who co-manage the fishery resources to incorporate some or all of our islands into any bottomfish management plan.

Comment: The marine birds and mammals are intimately linked to the health of the intertidal zone and very little is mentioned concerning the marine aspect of the NWRs. Please look at protecting eelgrass beds, kelp beds, and sedentary, long-lived, and slowly reproducing bottomfish species.

Service Response: The Service acknowledges the important linkage between the upland Refuge areas and the marine environment. We will continue to work with the many agency and interest groups in the San Juans to identify key marine areas that support Refuge wildlife resources. We have identified the need to work with Washington Department of Natural Resources in establishing appropriate shoreline buffers (leases or withdrawals) to protect shoreline and intertidal resources in Chapter 2, Objectives 1.2, 1.3, 6.1, and 8.2.

Comment: I am generally in favor of Alternative B. I think that it will be expensive to initiate, however, I don't want to see enforcement take a back seat to the signage and habitat management. We need to protect what we have effectively, and then work on restoration. Thanks for your time.

Service Response: Thank you for your comments to the Draft CCP. We have identified enforcement as a key component of our CCP. We included the need for additional staff and placement of that staff in the San Juans in Chapter 2, Objectives 6.1, 6.2, 7.2, 7.3, 8.2.

13. Peter Dunwiddie

Comment: I am writing in support of Alternative B: The preferred alternative. USFWS staff should be commended for the effort that has been directed at preparing a draft plan that pays careful attention to protection and management of all the resources - plant, bird, and other fauna - within the Refuge. I would like to take this opportunity to make several additional comments and suggestions regarding the plan.

Fire Management: I support the intention to update the Fire Management Plan to include the use of prescribed fire on Refuge lands. This is an important tool to be used in the restoration and management of native grassland habitats, and provisions that allow for its use need to be developed.

Service Response: Thank you for your support of our preferred alternative. The Service agrees there is a need to update the Fire Management Plan to include fire as a tool for habitat management. Any proposed burn would be implemented under a burn plan that identifies specific goals and objectives and the prescriptions under which it would occur.

Comment: *Deer Removal:* The USFWS is correct in recommending the removal of all deer from Protection Island. This not only removes the threat of their trampling the burrows of nesting seabirds, but eliminates the damage that large numbers of deer can inflict on native vegetation due to grazing. This will be especially important to avoid when the planned restoration of native vegetation on the island is undertaken, an action that I also strongly support. However, the plan also needs to recognize the severe impacts deer are already having on the native vegetation on some other islands in the Refuge. For example, the flora of Nob Island has been heavily grazed by deer, leaving it relatively depauperate of species, and dominated by invasive exotics. Systematic evaluations should be made to determine on which islands the greatest deer problems exist, establish a monitoring system to track impacts on sensitive sites, and develop methods to reduce impacts where necessary. Canadian researchers in the Gulf Islands have carried out extensive investigations that document the significant and rapid impacts deer are having on some islands, and their findings are equally applicable to the Refuge islands.

Service Response: The Service agrees that systematic evaluations should be made to determine which refuge islands have the greatest deer abundance and assess impacts. We recognize that deer are impacting native vegetation within the San Juan Archipelago. However, due to the abundance and mobility of this species throughout the archipelago, coupled with wilderness designation on all but three refuge islands, viable, long-term methods to reduce impacts are limited. We will be working with WDFW and Treaty Tribes to develop the methods for deer removal.

Comment: *Invasive species control:* Monitoring for and removing predators that can severely impact nesting birds, such as rats, red fox, cats, and dogs are important priorities that should be carried out on an on-going basis on Refuge islands. The plan also correctly highlights the non-native rabbits as an additional species (with the potential for deleterious impacts to vegetation) that should be monitored for and removed. Vigilance to inventory and control invasive plant species using IPM strategies is a high priority on all islands, together with efforts to detect infestations of new noxious weed invaders.

Service Response: We agree on how important monitoring and removing any non-native species (plant or animal) is to the protection of these island habitats and the diverse wildlife that inhabit them. In the CCP and incorporated Integrated Pest Management Program (Appendix E), the Service has considered many of the threats and treatments for managing these areas.

Comment: *Goose control (section 4.12.3):* Considerable evidence already exists from Canadian researchers in the Gulf Islands documenting the impacts of nesting, non-native Canada Geese on island vegetation. This introduced race of geese present a similar threat on many of the small islands in the San Juans, where they only began nesting in 1986. They nest frequently on the Refuge Islands due to the absence of human disturbance, dogs, cats, and other predators found on the larger islands. Oddly, the plan highlights detection and control of rabbits - a grazer that currently poses little or no threat to the native grasslands and balds on most of the small islands (since the chance of dispersal to most Refuge islands is small), but fails to recommend a similar stance to the non-native Canada geese, another introduced pest that already has been documented as having significant deleterious impacts on many of the Refuge islands. Given the urgency of this threat, the plan should specifically identify the priority of assessment and monitoring of goose impacts, and the development of goose control strategies. Finally, wording should be changed in section 4.12.3, which erroneously states that "management may not be warranted given the potential to damage fragile plant communities." I assume the "not" is a typographical error, as the potential for damage is demonstrably very high.

Service Response: We have modified Chapter 4, Section 4.12.3 to clarify our stance on the issue. We have reports from vegetative surveys conducted on refuge islands that confirm the existence of nesting Canada geese and note some effects to vegetation (Bennett 2007). The Service considers this an ecosystem-wide issue and beyond the scope of this CCP. To adequately address this issue, we believe management must include all appropriate conservation partners. However, increased presence of refuge staff on the islands as identified in the CCP will provide opportunities to monitor goose abundance and assess impacts to native vegetation.

Comment: *Protection and restoration of herbaceous savanna, grassland, and bald habitat:* The plan correctly identifies the significance of this habitat, and the many rare species associated with it, as key priorities on both Protection Island and on many of the other small Refuge islands. Proposed restoration of this habitat on Protection Island, as well as potential restoration of rare plant species and butterfly host plants, are excellent strategies. The plan also identifies appropriate strategies in these habitats regarding the monitoring for and control of invasive plants and animals, continuing of inventories and surveys, and managing recreational use on Turn and Matia to avoid impacts to these sensitive habitats.

Service Response: Thank you for your support of our proposed restoration strategies outlined in this draft CCP. Although the Service only manages a small portion of each of these habitat types found within the Salish Sea region, we feel that the isolation of the island could offer addition protection to some species.

Comment: *Research and monitoring:* I support the emphasis in the plan recognizing the importance of gathering more information - through facilitating and undertaking new research and monitoring - to gain answers and improve understanding of the status and management of resources in the Refuge. The plan identifies many areas where information deficits exist, and directing resources towards filling these gaps is critical for successful, long-term Refuge management.

Thank you for the opportunity to comment on this important document. The draft CCP will provide valuable guidance for managing the Refuge when it is implemented.

Service Response: Thank you for your review and comments on our Draft CCP/WSP/EA. We also want to acknowledge and say thank you for your past contributions to refuge vegetative data gaps.

14. David Giblin

Comment: I would like to lend my support for Alternative B. Central to this alternative is the need for additional floristic surveys to attain a comprehensive understanding of the diversity and distribution of

plants throughout Protection Island and San Juan Islands National Wildlife Refuges. The botanical survey work that I did in the San Juan Islands with my colleague Dr. Peter Dunwiddie contributed to the discovery of a new species of Indian paintbrush (Castilleja victoriae). The entire known U.S. distribution of this species occurs within the San Juan Islands. Moreover, it is critical to have baseline floristic data for all of the refuge islands in the face of climate change, as well as the known distribution of invasive plant species within the refuge that could potentially impact all biota there.

Service Response: Thank you for your support of our preferred alternative. We acknowledge and thank you, also, for your past contributions to reduce the refuge's vegetative data gaps. The Service agrees that additional information is needed through surveys, monitoring, and controlling non-native species as described in Chapter 2 Objective 9.4 and particularly for plants such as Castilleja victoriae on refuge islands. These concerns are also described within the Integrated Pest Management Program in Appendix E.

15. Margaret Gould-Stoltz

Comment: Please take serious consideration of the letters sent by Scout Troop 582. It is a difficult thing to take part in your discussion regarding Protection of the San Juan Islands Review, so please understand why you did not get a flood of responses. It is so true that many do not have opportunity to visit these places, ever, while others buy view lots across from them. With regard to power boats, it's also true that without accommodations for those, the argument for protection becomes moot. My son is just receiving his Eagle Scout award signed by President Obama! so we do have connections . . . and Katy Wilkens is a force to be reckoned with - albeit a very GOOD force (she also has a presence on local television network news). So, here's hoping you will consider the value this area holds for kids otherwise hooked up to the 2-D version, as well as the public at large.

Service Response: Thank you for reading the draft comprehensive conservation plan and for your comments. The Service takes all comments seriously and believes public input is an important part of the planning process. The National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57) recognizes that refuges are set aside for "wildlife first" while at the same time identifying compatible wildlife-dependent recreational uses as the priority general public uses of the Refuge System. These uses must be found to be compatible and can include hunting, fishing, wildlife observation, photography, environmental education, and interpretation. Camping is not identified as a wildlife-dependent public use, but the Service felt that with some modifications to the current program it could be made appropriate and compatible and support wildlife observation, photography and interpretation. Because human-powered watercraft are slower than motorboats, allowing these visitors to camp on Turn Island facilitates their opportunity to safely reach the Island and have sufficient time to enjoy the Refuge's wildlife-dependent recreation without having to depart in time to reach alternate accommodations. Motorboats, on the other hand, have greater ability to safely travel to adjacent campground areas in inclement weather and in a shorter period of time.

The Service met with the Washington State Parks and Recreation Commission (WSPRC) during the development of the draft CCP as it considered all public uses, including day use and camping, and their appropriateness and compatibility with the Refuge's purpose. Discussions resulted in the proposal set out in alternative B, the Service's preferred alternative which is supported by the WSPRC. We believe that alternative B is viable and the WSPRC has stated their willingness to continue to partner with the Service on public uses for Turn Island with the new stipulations. Under the preferred alternative visitors arriving by motor and sail power would still be able to access the Island during the day and could camp on their boats while secured to the mooring buoys provided by the WSPRC.

16. James Hayward

Comment: Specific Suggestions and Remarks

Page 1.1 In the overview of wildlife, would it be appropriate to mention that PI is located midway between the ranges for Glaucous-winged Gulls and Western Gulls, and that it serves as (probably) the largest breeding ground for Glaucous-winged Gull x Western Gull hybrids? Thus, this refuge serves as a particularly important resource for the study of vertebrate hybridization, one of the best in the world. We currently are assessing reproductive success in hybrids in two of our study plots. We have characterized the degree of hybridization for both members of more than 70 pairs nesting gulls for which we have hatching success data. We are still working up the results but hope to have something in the next few months.

Service Response: Thank you for your thorough review of the documents and your comments. We have made the change to Chapter 4, section 4.8.2.

Comment: Page 2-5. I applaud interest in development of a fire-management plan as an aid to habitat restoration.

Page 2-5. I agree that Alternative B best meets the goals set forth earlier in the document.

Page 2-29. Objective 1.1 Restore Spit Habit (on PI). The proposed actions are consistent with our findings concerning habitat selection and hatching success by Glaucous-winged Gulls. We are beginning to obtain a detailed picture of what might be considered "optimum" nesting habitat for these birds. See poster titled "Effects of Climate, Habitat, and Predation on Hatching Success in Glaucous-winged Gulls" (cited below) for a detailed summary.

Page 2-30. Note concerning "Rationale": Another important resource at the distal end of Violet Point is the biological soil crust which covers dryer areas. Biological soil crusts consist primarily of bryophytes, lichens, and cyanobacteria. Where found, they play important ecological roles involving nutrient cycling, respiration, erosion control, and provision of habitat for small arthropods. The following website briefly summarizes the nature and value of these crusts:

http://www.anbg.gov.au/ bryophyte/ecology-arid-soil-crusts.html

Note: As part of our botanical survey, I have made a collection of various species and forms of bryophytes and lichens composing this crust. Once identified, these will be transferred to the Burke Museum (University of Washington) as documentation.

Service Response: We appreciate your support for our objectives and the information regarding gull and spit habitat components. We look forward to the results of your botanical survey.

Comment: Page 2-31. In addition, you might reference the poster mentioned above and our recent paper on Bald Eagle activity:

Hayward, J.L., and S.M. Henson. 2010. Effects of climate, habitat, and predation on hatching success in Glaucous-winged Gulls. Poster presentation, First World Seabird Conference, Victoria, British Columbia. 8-9 September.

Hayward, J.L., Galusha, J.G., and S.M. Henson. 2010. Foraging-related activity of Bald Eagles at a Washington seabird colony and seal rookery. Journal of Raptor Research 44:19-29.

Page 2-36. Rationale, second paragraph: The paper below provides information on slope angle in relation to fledging activity by young auklets. Given the large number of auklet chicks that die each year on the gull colony (see paper), plans to enhance burrowing habitat on the south edge of the island are important.

Hayward, J. L., and J. K. Clayburn. 2004. Do rhinoceros auklet, Cerorhinca monocerata, fledglings fly to the sea from their natal burrows? The Canadian Field-Naturalist 118:615-617.

Service Response: We have made changes regarding bald eagle and gull habitat on Violet Spit.

Comment: Pages 2-36 to 2-54. I am delighted to see action planned toward reestablishment of native plants on PI. The current extent of invasive species on the island is disheartening and disadvantageous for wildlife.

Service Response: Your support of restoration of native plants on Protection Island is noted. The Service understands the importance of quality habitat, on all our islands, for wildlife and has outlined a foundation for achieving these goals in Chapter 2.5 goals 1-5. We hope to greatly reduce the effects and impacts of invasive and non-native plant species.

Comment: Page 2-58. I am always open to suggestions for the collection of data beneficial to better management of PI. Much of our current research is of benefit to management, particularly our long-term study of factors influencing hatching success in Glaucous-winged Gulls (now five years completed), our botanical survey (mostly complete but needing summarization and publication), and our examination of the extent of Glaucous-winged x Western Gull hybridization and the impact of this phenomenon on hatching success (initiated this year). The long-term study is revealing information on the impact of climate change on Glaucous-winged Gull reproductive success. For example, we have shown that higher temperatures associated with El Niño events (and possibly by extension, global warming) decrease hatching success and increase egg cannibalism in this species.

Page 2-65. Objective 9.6 Paleontological Resources Inventory: I plan to submit a proposal to refuge management to perform such a survey. Our work on eggshell taphonomy has resulted in the publication of seven papers in international paleontological and sedimentological journals, with an eighth nearly ready for submission. I am acquainted with paleontologists, palynologists, and sedimentologists with whom I can partner to complete a comprehensive survey of PI's geological and paleontological resources. We have been recommended to receive another grant from NSF for our seabird work. This grant contains funds to purchase the highest quality GPS system available. This will enable us to record precise locations of paleontological finds and sedimentary deposits. Bob Carson (Whitman College), who did a preliminary survey of PI geology during the 1980s, suggested that the material composing the island has a 40,000-year history. We really need a better understanding of that history.

Service Response: The Service appreciates the work that you have done to assist the refuge in meeting management needs. Objective 9.1 will guide management of the scientific research program and all proposals will be evaluated using some of the strategies outlined in this objective. Targeted research projects will be identified by refuge staff and a research committee with approximately 80% of projects contributing to information needs of management on refuge lands. We look forward to working with you in the future through this more formalized process.

Comment: Sections 3.1 and 3.2: Climate and Climate Change and Oceanography and Climate Change: Our long-term study on reproductive success in Glaucous-winged Gulls is providing information on the effects of climate. As noted above, hatching success declines and egg cannibalism increases with increasing temperature. More data are needed, however, to examine these trends in detail. Moreover, we have unpublished habitat occupancy data which suggests that numbers of Pigeon Guillemots, Harlequin Ducks, and other island residents (or visitors) declined during the strong 1998-1999 El Niño event.

Page 3-1. Our weather station, which typically operates from May to October, records a variety of climate variables. We post these data on our website each year:
http://www.andrews.edu/~henson/seabird/data.htm 1

Page 4-39. Climate Change: See our recent poster for the effects of El Niño on PI gulls (cited above).

Service Response: Again, thank you for providing this information. We appreciate your time and efforts in gathering this research data and want to use the best available science in implementing the CCP. We look forward to your final publication of this data

Comment: Page 4-41. Under "Predation": Reference to Hayward (2004) should read Hayward and Clayburn (2004); this is The Canadian Field-Naturalist paper cited above.

Page 4-43. Section 4.9.3: The reference Hayward (2005; an unpublished report to USFW) should be changed to Hayward et al. (2010); this is the Journal of Raptor Research paper cited above. The latter paper provides a more accessible published report.

Page 4-56. References on this page are out of alphabetical order.

Page 4-62. Add references to Hayward and Clayburn (2004), Hayward et al. (2010), and Hayward and Henson (2010), all cited above.

Service Response: Thank you for the corrections and additional information. These changes have been made to the CCP.

Comment: Page 6-2. Section 6.1.2 and beyond: I applaud the plan to implement integrated pest management procedures to reduce the impact of invasive species.

General Comments

1. Based on our 2010 woodland bird survey (suggesting that 25 to 30 species of non-seabirds use the island for breeding) and list of 132 bird species recorded on PI, perhaps a short section on the significance of PI to species of non-seabirds. (I may have overlooked a section that dealt with this, but did not notice such a section.) Moreover, our observations these past two summers of Sandhill Cranes, both Eastern and Western Kingbirds, and a Sage Thrasher suggest that this island serves as a rest stop for transient, non-seabird species. Proposed restoration and connection of the wooded areas will enhance this function.

Service Response: Please see Objectives 3.1, 4.1, 4.2, and 9.3 for objectives that address non-seabirds, particularly songbirds and raptors of woodlands and grasslands. Also, see Appendix C, sections C.1 and C.2. The species and habitats highlighted in Chapter 4 are addressed more fully because they are identified in the establishing legislation for Protection Island NWR and are especially important resources of both Refuges. We agree that non-seabirds are important to the refuge, however, inclusion of all species that might use the Refuges is not feasible.

Comment: 2. Based on the experience of personnel at other refuges, published research, research by the Rhinoceros Auklet team this past summer, our data on gull colony disturbances, and the proposed habitat restoration plan, deer removal from PI has become a necessity. I hope this can be done as humanely as possible with minimal disturbance to other wildlife.

Service Response: The Service acknowledges your support of the proposed habitat restoration and deer removal on Protection Island. The manner of removing deer from the island has not yet been determined, but we will work with Washington Department of Fish and Wildlife and Treaty Tribes on a plan.

Comment: 3. On the plane and bus to the recent First World Seabird Conference held last week in Victoria, BC, I had occasion to meet and talk at length with Dr. Steven Kress of the National Audubon Society and Cornell University. Steve's work on restoring breeding Atlantic Puffins to several islands off the coast of Maine is legendary and has always intrigued me. I mentioned to him that PI now has fewer Tufted Puffins than in past years and wondered if he thought numbers could be enhanced. He expressed interest and said he would be happy to help with a restoration project focused on these birds. He has helped with scores of such projects at many seabird sites around the world.

Service Response: We believe that Tufted Puffins are a priority for conservation on the refuge; as such, they are specifically addressed in Objectives 2.2, 9.2, and 9.3. Also see chapter 4, sections 4.8.4 and 4.8.6 for basic objectives and specific research questions which have been identified to guide the development and implementation of management strategies for Tufted Puffins that are appropriate to the two refuges.

Before any "restoration" of Tufted Puffin would be considered, demographic studies must be conducted to determine limiting factors for this species in the Salish Sea ecosystem. If restoration is warranted, the Service will consult with seabird restoration experts including Dr. Kress.

17. Shandelle Henson

Comment: Thank you for sending the draft CCP to me, and for giving me the chance to comment. I support all of Jim's (Jim Hayward's) comments, and have only a few extra comments of my own.

1. This comment pertains to the spit restoration and mowing of beach grass on PI. Eagles are taking a serious toll on seabirds, both in the Refuge and elsewhere. I believe it would be possible to experiment (on Violet Point, PI) with noninvasive ways to discourage excessive eagle predation of the gull colony. If such techniques were successful, beach grass could be eradicated on the end of the spit and that area could be re-colonized by gulls. This could serve as a pilot study for protecting/restoring tern, puffin, and other seabird colonies in the Refuge. (I suspect that the careful placement of tall poles in the colony might discourage eagle predation, but this would need to be tested.)

Service Response: Thank you for reviewing and commenting on our Draft CCP/WSP/EA. At this point, the Service does not intend to interfere with natural predation by bald eagles on Protection Island (see Chapter 4, section 4.12.5).

Comment: 2. This comment pertains to the bunkhouse for researchers. Much modern ecological research, especially as related to climate change, relies upon dynamical systems theory (mathematical models of changing systems). This kind of research requires quiet analysis and intense concentration as well as data collection. I suggest that, along with the bunkhouse, there should be a quiet research office that is physically separate from, but close to, the living and eating quarters. This would allow all researchers to utilize their time efficiently.

Service Response: Thank you for your comment. The Service intends to reduce the footprint of its facilities on PI by limiting the number of structures. Recognizing the need for quiet space, the Service will endeavor to accommodate this in the design of any new "research" facility.

Comment: 3. This comment pertains to the deer on PI. The deer population on PI seems like a good opportunity to let a researcher study techniques of sterilization of deer. Thank you for the work you have put into this draft CCP!

Service Response: The Service will work with WDFW and Point-No-Point Treaty Tribes in the development of a step-down plan to remove deer from Protection Island. This plan will address all possible means to remove deer from the island.

18. David Hooper

Comment: I have reviewed the proposed alternatives for the subject refuges and strongly urge adoption of Alternative B. As a retired fishery biologist and environmental studies instructor, I am in full support of all actions taken to protect/improve our marine and shoreline habitats. I live at Cattle Point on San Juan Island and cannot emphasize enough how much my wife and I enjoy this island environment. Do all you can to save and improve it!

Service Response: Thank you for reviewing the draft CCP and your support of the management goals outlined in our preferred alternative in the document. The importance of island shorelines has been well

incorporated into Chapter 2.5 Goals, Objectives and Strategies. Specific issues such as marine debris, oil spill, and human disturbance are outlined in Goal 1, Objective 1.1 strategy g; Objective 1.2 strategies a, b c, d; and Objective 1.3 strategies a and c. Also, in Goal 6 and 8 which discuss visitor use, education, and wilderness stewardship respectively; we hope to bring people the opportunity to learn, enjoy, and protect these island environments.

19. Liz Illg

Comment: Thank you for the opportunity to review the draft CCP for the San Juans. I have two personal notes and then a professional request:
1) Please include creosote products in the list of marine debris. I notice there have been several large scale removal projects in the islands, but not all properties seem to qualify. You'll want to be sure to get the NWR beaches included in any further assessment or removal work.

Service Response: The Service agrees that creosote products on Refuge island beaches is undesirable. In Chapter 2, Objectives 1.2 and 1.3 outline strategies (c) to remove marine debris and contaminated material. Rationale for Objective 1.2 addresses our concern with creosote impregnated logs. The Service has worked with The Washington Department of Natural Resources at Dungeness NWR and Protection Island NWR on creosote log removal projects and will continue this partnership when available. We will also explore other partnerships to accomplish contaminated material removal.

Comment: 2) I vote for Alternative B for Turn Island. I had occasion to take several grandchildren there for a campout a couple of summers ago and they very much want to do it again. It is a charming, accessible, and pleasant destination for human-powered craft. A reservation and fee arrangement would make it even more desirable, I think.

Service Response: Thank you for your comment. The changes to the camping program identified in the preferred alternative will ensure this activity, in support of wildlife observation, interpretation and wildlife photography, is compatible with refuge purposes. Because human-powered watercraft are slower than motorboats, allowing these visitors to camp on Matia and Turn Islands facilitates their opportunity to travel greater distances to observe and photograph wildlife throughout the San Juan Archipelago and provides safe haven to rest, and if necessary, to allow wind and inclement weather to abate. After reviewing other comments expressing concerns over the camping reservation system, the Service has decided to postpone implementation of a reservation system pending monitoring of Turn and Matia Islands for compliance with camping regulations. A reservation system may still be implemented in the future if deemed necessary.

Comment: Request: Can you send me a press release once you know when the public meeting will be in the San Juans? I'd like to include it in the next Scenic Byway Update.

Service Response: Public involvement throughout the planning process is summarized in Appendix K. Public meetings were held in September 2008 in Friday Harbor, WA, and Port Townsend, WA. No additional public meetings are scheduled.

20. Neal Jander

Comment: I read over the Overview of Draft CCP/EA Alternatives and I like Alternative B: (Proffered Alternative). It appears to be an educated and well thought out advancement of alternative A.

Service Response: Thank you for reviewing and commenting on the draft comprehensive conservation plan for Protection Island and San Juan Islands National Wildlife Refuges and for your support of the preferred alternative (B).

21. Russ Johnson

Comment: Concerning Protection Island and San Juan Islands National Wildlife Refuges, of the three conservation/stewardship plan alternatives offered, I prefer Alternative B because it does the most to limit human disturbance. After all, a wildlife refuge is just that – a refuge from human activity and not a recreation area. So implement Alternative B and administer it strictly.

Service Response: Thank you reviewing the draft CCP and for your support of the management goals outlined in our preferred alternative. Human disturbance is a focal issue having many facets, including but not limited to, pollution, wildlife harassment, non-native flora and fauna introductions, and education. These topics are all covered in Chapter 2.5 Goals, Objectives, and Strategies. All goals cover the human disturbance in some way with the exception of Goal 9, which discusses the scientific research on the islands. Although our jurisdiction is restricted to our islands, we look to partner even more with other groups, as outlined in Goals 6 and 7, to minimize human disturbance from outside our boundaries.

22. Kassandra Kersting

Comment: I wish to express my opinion on enforcing the no pet regulation on the San Juan Islands Refuge lands. It is my wish that pets are not allowed in these areas. I live a mile from Port Williams Beach. It has been my custom to walk 3 miles each morning and I have often walked on the beach. In the 11 years I have been doing this the decrease in bird life has been dramatic. I know bird life has decreased but certainly not to this extent. Persons with dogs encourage them to harass the birds. They also harass me coming from behind while I am walking. They are allowed to defecate on the beach with an owner telling me the tide will take care of the matter. While a dog is my favorite pet I do not believe they are privileged and can do no wrong.

When I go to the picnic area on Hurricane Ridge, dogs are now allowed in this area. Wildlife is seldom if ever seen as had been before. I go to see the wildlife.....we see dogs each day.
I have a bird wildlife area in my yard. The cats wait under the feeders. Neighbors feel their animals have the right to hunt in this yard even after cordial requests that they keep their housecats home.

Any efforts you make to address what I see as problems from occurring on the San Juans would be much appreciated.

Service Response: Thank you for reviewing the draft CCP and your support of the management goals outlined in our preferred alternative. The specific issue with pets (dogs and cats) in particular and the disturbance they cause to wildlife is not compatible with our management goals of the refuge. We have outlined our management strategies for these animals in Chapter 2.5 "Goals, Objectives and Strategies" in goals 1-6, which would prohibit pets from Matia and Turn Islands, and in the Integrated Pest Management Program in Appendix E. Additionally, the potential for disease transmission between wild animals and pets as well as our pets to wild animals is well documented in scientific literature.

23. Kari Koski

Comment: I would like to thank you for the opportunity to provide comments on the US Fish and Wildlife Service's (USFWS) Protection Island and San Juan Islands National Wildlife Refuge Draft

Comprehensive Conservation Plan, Draft Wilderness Stewardship Plan, and Environmental Assessment (Draft CCP/WSP/EA). I appreciate your efforts to explore a wide variety of options for the conservation management of some of the most diverse and special places within the Salish Sea, specifically within the San Juan Islands. Please accept the following comments.

I have worked with The Whale Museum's Soundwatch Boater Education Program since 1993 and have had the opportunity to work with the San Juan Islands Refuge system through on-the-water education and monitoring of the sites as well as working with Refuge staff and other regional federal, state, and local marine managers on new wildlife and habitat management strategies, namely looking at the Refuge as a system of Marine Protected Areas. I support the Draft CCP/WSP/EA USFWS Preferred Alternative B. I applaud this management plan alternative because it places a high prioritization on natural and cultural resource management while also supporting new opportunities for the public to develop a greater stewardship ethic for the refuge islands. This alternative supports both the protection and restoration of quality habitats for seabirds and marine mammals as well as expanded interpretation and educational programming on natural and cultural resources which I believe will help the public better understand the role of the National Wildlife Refuge System and learn how they can reduce their own impacts.

I also appreciate the opportunities this management plan provides for increased scientific research which will help regional marine managers to better understand the Salish Sea ecosystem and assist with better management of the entire Refuge system. It is commendable that the USFWS is taking an active role in managing the marine resources as well as the adjoining uplands within the Refuge system. I am particularly supportive of management actions such as those that will focus more efforts on protecting nearshore, tideland, and bedland habitats, as they are critical in supporting both seabird and marine mammal populations using the Refuge, and also support forage fish, bottomfish and salmon populations that are in habitats adjacent to the Refuge. These species are important prey resources for the endangered population of Southern Resident Killer Whales.

Continued and expanded partnerships with other regional management agencies such as the Department of Natural Resources and the San Juan County Marine Resources Committee is an excellent way to further mutual resource protection objectives. The Whale Museum's Soundwatch Program is also looking forward to continuing and expanding its already excellent working relationship with the USFWS, and is especially excited to work with existing Refuge staff as well as the newly proposed San Juan Island-based Refuge staff to help promote appropriate wildlife viewing opportunities with the Refuge, monitor public use and conduct marine wildlife surveys, and assist with marine stewardship interpretation and education programming about the San Juan Islands and Protection Island Refuge. I look forward to working with the excellent Refuge staff and to the continued protection of the some of the islands most unique and special habitats.

Service Response: Thank you for your review and comments on the Draft CCP. Your support for the preferred alternative is appreciated. We agree on the importance of managing the natural and cultural resources of the refuges and increasing public awareness of and support for the refuges. The Service acknowledges and appreciates the long and productive relationship we have had with the Whale Museum's Soundwatch Program and looks forward to continuing and expanding this and additional partnerships to assist in implementation of the CCP.

24. Fayette Krause

Comment: Please accept the attached comments for the Draft CCP cited above. Thank you for the opportunity to comment on a thorough and thoughtful document. I fully support the Preferred Alternative B.

I am writing in support of Alternative B: The Preferred Alternative. I have worked for over thirty years in natural resources management and give high praise to the Fish and Wildlife staff who prepared

the Protection Island/San Juan NWR document. This is truly one of the finest planning processes that I have monitored – one in which prior public comment has helped to shape and strengthen this critically important plan. While I agree with nearly all of the management activities discussed in the Draft's Preferred Alternative, I will specifically address a number of the key management topics below.

1. *Tidelands and Bedlands:* I fully support the Refuge's work with the DNR to permanently protect the 200-yard surface water and tideland/bedland buffer around Protection Island. This existing buffer, which has been largely adhered to by commercial operators and many of the general boating public, is of high importance for the long-term preservation of the birds and mammals that use the island as a nesting and haul-out area. Similarly, I applaud the Service and DNR for working together to define an analogous 200-yard buffer around other Refuge islands in the San Juan archipelago. Withdrawal of these lands from lease or harvest will protect nesting terrestrial species, like black oystercatchers and pigeon guillemot, while also preserving an intact aquatic ecosystem where native flora and fauna can thrive. This is one of the most important protective steps in the planning document, and I commend the Service and the DNR for including this management advance in the CCP.

2. *Derelict Gear Removal:* Thanks to the Service for supporting the Northwest Straits Commission's important marine undertaking. This work will benefit many aquatic species as well as alcids and other diving birds that may get entangled in lost gear. Removal of marine debris and contaminated materials from terrestrial sites near and on the Refuge should also be high priorities for management action.

3**.** *Deer Removal on Protection Island:* I fully support the removal of *all* deer from Protection Island. The Refuge has correctly identified the nesting bird species as the highest priority fauna for management on the island. Deer, on the other hand, are abundant in Jefferson County – especially in urban and other non-hunted areas where they have often become pestiferous. Such unfortunately is the case on Protection Island, where previous management practices have encouraged deer use. The current plan's call for removal of deer from the island is precisely what is needed. By removing these ungulates the Service will minimize future trampling of nesting burrows, while also decreasing erosion fostered by deer trails. Other goals, such as grassland/woodland restoration, will be enhanced as well.

A single cautionary [*sic*] on the deer removal program. While working with WDFW to remove deer, the *full and expeditious removal* of deer must be the objective. Managing to produce a lowered number of deer, to facilitate a continuing on-island hunt, does not meet the goal of protecting the nesting seabirds.

Response: Thank you for reading and commenting on the Draft CCP and for your support of the preferred alternative. Removing debris and contaminated material is one of our strategies to restore, protect, and maintain habitats found on the refuges. The process for deer removal from Protection Island has not yet been developed. The Service will work with WDFW and Treaty Tribes to assess available optionsthrough a separate step-down management planning process.

Comment: 4. *Invasive species:* Monitoring for and removing non-native species, such as rats, rabbits, and fox, are obligatory in the protection of nesting seabirds and shorebirds. This needs to be a high priority for the Refuge. In addition, I fully support restoration of native habitat on Protection Island, both grassland and, where appropriate, forested upland with an appropriate native understory, keeping in mind that for most of the island, the grassland is the priority habitat.

5. *Removal of Structures on Protection Island:* I fully support the removal of structures when lease periods expire, especially in that part of the island where the auklet colony is expanding.

6. *Protection of Mature/Old Growth Stands within San Juans:* I very much appreciate the Service singling out forests on six of its San Juans holdings for additional monitoring and potential management, if required. The Service has responsibilities for perpetuating several uncommon/rare forest types in its San Juan Wilderness system. Emphasizing this protective action while permitting appropriate human activity on these islands must be periodically evaluated. Long-term photo-monitoring or other actions should be employed to ensure that the forest types are not being degraded by human use.

Response: Long-term photo-monitoring of forest types, particularly in restoration areas where visitors have access, is an excellent idea. We will assess the logistics to determine feasibility. In addition, under the preferred alternative, there would be increased law enforcement presence.

Comment: 7. *Guiding Research:* It is time for the Refuge to primarily base research access to its holdings upon how proposed studies will answer critical management questions that confront the agency. The agency should also favor non-destructive studies/techniques, especially as they are employed at high value nesting areas, such as Protection Island. If habitat restoration does occur, rigorous before/after monitoring is imperative to determine the efficacy of the restoration in regard to enhancing priority species.

8. **Turn/Matia Islands Public Visitation**: I support the access beaches at Turn Island as described in the Preferred Alternative. Establishing Turn & Matia Islands as day-use islands, with the exception of permitted campers, may help resolve some of the problems associated with Turn Island especially.

I further commend making camping at Turn and Matia Islands open to human-powered boats only. I was part of a management team for an NGO that had responsibility for monitoring/over-seeing day use of a private nature preserve in the San Juans. Over the years we observed that more and more of our visitors were arriving by non-motorized craft, almost exclusively kayaks. Currently, during the summer months, more than 50% of the visitors to this private reserve arrive by kayaks. Clearly, there is a clientele for what the Service is proposing.

In addition, I support the proposed reservation system and the down-sizing of the campsites on Turn Island. This new approach will improve the Service's ability to track use and to better organize visitation.

I also support the prohibition of pets on the Refuge. They are inappropriate to an island system with the fragility and ecological sensitivities present in the San Juans. Finally, I encourage the Service to work closely with organized kayak clubs and the Washington Water Trails Association to ensure proper etiquette when kayakers use the Refuge's Wilderness system. Working collaboratively with such groups has the added benefit of ensuring that written material disseminated by the group(s) can be reviewed by Refuge staff for accuracy. Responsible use must be inculcated.

Response: We agree and have identified the importance of working with kayak and other boating groups through the specific strategies identified in Chapter 2, Objective 7.3. Again, we appreciate your support for our goals and objectives, including using human-powered boats to arrive at Turn or Matia Islands for camping, the reduction in the number of campsites, and not allowing pets on the islands.

Comment: 9**.** *Signing:* The use of large "stay away 200 yards" signs on a subset of the most ecologically important/sensitive islands should be implemented as soon as possible.

10. *Staffing/Partnerships:* If the Refuge is not in a position to enhance staff visitation/monitoring of the San Juan Islands Wilderness system, it becomes even more imperative that the agency work closely with partners to achieve the CCP goals.

- The tideland/bedland cooperation with the DNR is an excellent beginning. Please continue this work with the DNR.
- I also urge close cooperation with St. Parks and its enforcement staff, especially when it comes to implementing new regulations pertinent to Turn and Matia Islands. St. Parks enforcement must clearly understand the Service's intention to increase compliance with existing regulations (campfires), while implementing new landing and camping regulations at the two visitor accessible islands.
- In addition, contact with the San Juan County Sheriff's Department should be initiated, if it is not current.

•Finally, a working relationship with NGO's, where appropriate, can help extend the Service's protective capacity in the San Juans. Serious consideration should be given to forging these continuing relationships.

Thank you for the opportunity to comment on the Draft CCP. When this plan is fully implemented, it will measurably add to the protection and preservation of this maritime system's immensely important wildlife.

Response: We look forward to working with our partners to implement the CCP and continue the work of conserving, managing, and restoring these refuges and the resources they encompass.

25. Laura Leschner

Comment: I'd like to comment on the Protection Island and San Juan Islands National Wildlife Refuge plans. Remove the deer from Protection Island. I suggest a limited entry hunt with a few hunters, perhaps disabled hunters due to the accessible site. I studied birds on Protection Island many years ago, visited the site recently, and I know that the site is very accessible. The deer are damaging the rhinoceros auklet burrows. I observed deer grazing on the slope right on top of the burrows.

Service Response: Thank you for taking the time to review the draft CCP and provide comments. The Service will work with WDFW and Point-No-Point Treaty Tribes in development of a step-down plan to remove deer from Protection Island. This plan will address all possible means to remove deer from the island.

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Comment: Continue pigeon guillemot and rhinoceros auklet research on the island. It is an accessible location and an important colony in Puget Sound. It is one of the few locations where pigeon guillemots can be studied because nests are accessible in the artificial burrows. Other seabird researchers use the success of the pigeon guillemots on Protection Island to gage success at colonies that they monitor. Most colonies do not have accessible burrows and the colony monitors must infer success by observing birds with fish. Consider re-introduction of tufted puffin.

Service Response: The Service intends to continue guillemot and auklet studies on Protection Island. In addition to monitoring of artificial burrows for pigeon guillemots we propose to expand monitoring to a sub-set of natural habitats. We believe that tufted puffins are a priority for conservation on the refuge; As such, they are specifically addressed in Objectives 2.2, 9.2 and 9.3. Also see chapter 4, sections 4.8.4 and 4.8.6 for basic objectives and specific research questions which have been identified to guide the development and implementation of management strategies for tufted puffins that are appropriate to the two refuges. Before any "restoration" of tufted puffin would be considered, demographic studies must be conducted to determine limiting factors for this species in the Salish Sea ecosystem.

Comment: Research priorities: Yes refuge goals are important, but the birds on Protection Island and the other island contribute to the entire Puget Sound ecosystem and the ocean. Research goals should also address the larger marine ecosystem and the opportunity to study marine bird populations and the behavior of physiology of species that nest on the island but travel throughout a wide range.

Service Response: We concur.

Comment: I think that Protection Island is a great location for public education. This is one of the few places where seabirds can be observed with little disturbance and the evening arrival of the rhinoceros auklets is amazing. I support docent led tours of the island via controlled access in a pest free tour or refuge boat.

Service Response: The Service has identified educational opportunities in Chapter 2, Objectives 6.4 and 6.5. The Service does not support public tours of Protection Island at this time but agrees that there are educational opportunities off island. Strategies to accomplish this are laid out in Objective 7.1.

Comment: I think restoring spit habitat on Minor Island will be a problem due to the harbor seal population. I support Alternative B. I am not so sure that the cost of native habitat restoration is worth the high cost and continual fight to maintain native species. Are there some threatened species that would benefit? Thank you for the opportunity to comment.

Service Response: Various restoration methodologies will be studied prior to implementation. Studies will include assessing success at achieving the desired goal plus cost of implementation. Results will dictate the degree and amount of restoration that will take place. All restoration activities will take place in a manner that limits the potential for wildlife disturbance.

26. Brenda Nixdorf

Comment: I am emailing to give my comments on the future of Turn Island. I would like to see the adoption of Alternative A - keep the current management. I have camped at Turn Island for several years, either arriving by kayak or powered boat. It is a beautiful refuge that should be kept available to boaters and kayakers.

Service Response: Thank you for reading the draft comprehensive conservation plan and for your comments. The Service agrees that Turn Island is a beautiful place that should remain open to wildlife-dependent public use. Under the preferred alternative, B, all manner of watercraft would be allowed to land and visit the island during dayuse hours. The National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57) recognizes that refuges are set aside for "wildlife first" while at the same time identifying compatible wildlife-dependent recreational uses as the priority general public uses of the Refuge System. These uses must be found to be compatible and can include hunting, fishing, wildlife observation, photography, environmental education, and interpretation. Camping is not identified as a wildlife dependent public use but the Service felt that with some modifications to the current program it could be made appropriate and compatible and support wildlife observation, photography, and interpretation. Because human-powered watercraft are slower than motorboats, allowing these visitors to camp on Turn Island facilitates their opportunity to safely reach the Island and have sufficient time to enjoy the Refuge's wildlife-dependent recreation without having to depart in time to reach alternate accommodations. Motorboats, on the other hand, have greater ability to safely travel to adjacent campground areas in inclement weather and in a shorter period of time.

The Service has had a long term relationship with the Washington State Parks and Recreation Commission (WSPRC) on Matia and Turn Islands which is formalized in a Memorandum of Understanding. They established and maintain facilities needed for day use and overnight camping. The Service met with the WSPRC during the development of the draft CCP as it considered public uses and their appropriateness and compatibility with the Refuge's purpose. Discussions resulted in the proposal set out in alternative B, the Service's preferred alternative which is supported by the WSPRC. We believe that alternative B is viable and the WSPRC has stated their willingness to continue to partner with the Service on public uses for Turn Island with the new stipulations. Under the preferred alternative, visitors arriving by motor and sail power could still camp on their boats while secured to mooring buoys provided by the WSPRC.

27. Evan Patrick

Comment: As a scout who has been going to Turn Island for the past few years, and who would enjoy the opportunity to go there again, I would like to give you my opinion on what to do with the preserve.

I know that you are concerned with keeping the Island habitat healthy for the animals that pass through, but I have not heard anyone discuss what negative impact campers are having on species on Turn Island. Campers are all confined to one small corner of the Island, and there is only one trail around the circumference of the island, no access to the interior. The main attraction is the water, not the island.

As of now, Turn Island has little traffic. In our last week there in the middle of summer, there was no single day when the entire campground was full, even with motor traffic. If, in the peak season, the designated campgrounds, which have been there for decades, aren't full, I do not see why there needs to be more restrictions. I realize preservation is important, but if people can't experience the outdoors, why would they want to preserve it in the future? There needs to be a balance between preservation and education. Maybe placing signs on Turn Island that explain what that plastic bag could do during the thousands of years it is the environment, and how to leave as little trace as possible so as to preserve the ecology may help users conserve the island better here as well as everywhere else they may visit.

Service Response: Thank you for reading the draft comprehensive conservation plan and for your comments. The Service believes input from Refuge users provides valuable insight and is critical to developing an effective management plan. Turn Island is part of the San Juan Islands National Wildlife Refuge and is managed by the U.S. Fish and Wildlife Service. The camping area and associated facilities are provided, managed, and maintained by the Washington State Parks and Recreation Commission (WSPRC) under a Memorandum of Understanding with the Service. Figures supplied by the WSPRC show the vast majority of visitors to Turn Island are day use visitors who would benefit from an enhanced interpretive and environmental education program as you suggest. The Service identifies strategies to accomplish this in Chapter 2, objectives 6.1 and 6.2.

Currently the whole of Turn Island is open to the public and there is evidence that visitors regularly access the Island's interior. The Service's preferred alternative in chapter 2, objective 6.1, includes closing the Island's interior to reduce disturbance to wildlife habitat.

Comment: Locking the doors to people who can be more responsible with more education isn't the answer. Turn Island is an amazing park that I would hope to revisit and share. Closing it to motorized traffic may not give the park enough campers for rangers to reasonably keep it open. I hope that you will consider my viewpoint on the Island.

Service Response: The Service is not closing Turn Island to wildlife-dependent public use and all manner of watercraft would be allowed to land and visit the island during dayuse hours. Turn Island is not a "park" but rather is part of a National Wildlife Refuge and as such has an inherently different purpose. The National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57) recognizes that refuges are set aside for "wildlife first" while at the same time identifying compatible wildlife-dependent recreational uses as the priority general public uses of the Refuge System. These uses must be found to be compatible and can include hunting, fishing, wildlife observation, photography, environmental education, and interpretation. Camping is not identified as a wildlife-dependent public use but the Service felt that with some modifications to the current program, it could be made appropriate and compatible and support wildlife observation, photography and interpretation. Because human-powered watercraft are slower than motorboats, allowing these visitors to camp on Turn Island facilitates their opportunity to safely reach the Island and have sufficient time to enjoy the Refuge's wildlife-dependent recreation without having to depart in time to reach alternate accommodations. Motorboats, on the other hand, have greater ability to safely travel to adjacent campground areas in inclement weather and in a shorter period of time.

The Service met with the Washington State Parks and Recreation Commission (WSPRC) during the development of the draft CCP as it considered camping and its appropriateness and compatibility with the Refuge's purpose. Discussions resulted in the proposal set out in alternative B, the Service's preferred alternative which is supported by the WSPRC. We believe that alternative B is a viable alternative and the WSPRC has stated their willingness to continue to partner with the Service on public uses for Turn Island with the new stipulations. Under the preferred alternative, visitors arriving by motor and sail power could still camp on their boats while secured to the mooring buoys provided by the WSPRC.

28. Teri Patrick

Comment: I would like to urge the planners to leave camping on Turn Island - and to keep it open to both motorized and non-motorized boats. I'm a kayaker, but the park rangers made it clear that without motorized boat traffic, there would not be enough campers to justify sending a ranger to the island - so the effect of banning motorized boats would be the same as closing the island to all camping. He also said that camping had dropped by at least a third once fires were prohibited. I do not object to the fire ban - especially if it discourages the kinds of visitors that tend to create problems. I would be very disappointed to see all camping banned, however. Turn Island is a beautiful, quiet, accessible island. It's a great place for families and for scouts. My sons have visited for several years and have learned to appreciate the region and its wildlife. My oldest son was recently accepted to West Point Military Academy. I say that because you never know where the kids who are impacted by their experiences on the island will go - and what effect those experiences will have on future decisions they might make - anywhere in the world. Evan, another of my sons - who has written his own letter, is a straight-A honor student and wants to study life-sciences at Cornell. He wants to work on resource issues. His passion for biology and life sciences was ignited during an experience on Turn Island when Katy Wilkens brought in a biologist to talk to the boys about the plant and animal life on Turn. Again - no one knows what the long-term implications will be - but I think the positive effects of allowing people to experience that beautiful place - with appropriate restrictions in place - outweighs the negative.

Service Response: Thank you for reading the draft comprehensive conservation plan and for your comments. The Service agrees that allowing people to experience the Refuge's wildlife and habitat with appropriate restrictions is important to developing a greater appreciation and understanding of the natural world. It is with this in mind that the Service has opened Matia and Turn Islands to public visitation. The National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57) recognizes that refuges are set aside for "wildlife first" while at the same time identifying compatible wildlife-dependent recreational uses as the priority general public uses of the Refuge System. These uses must be found to be compatible and can include hunting, fishing, wildlife observation, photography, environmental education, and interpretation. Camping is not identified as a wildlife-dependent public use, but the Service felt that with some modifications to the current program, it could be made appropriate and compatible and support wildlife observation, photography, and interpretation. Because human-powered watercraft are slower than motorboats, allowing these visitors to camp on Turn Island facilitates their opportunity to safely reach the Island and have sufficient time to enjoy the Refuge's wildlife-dependent recreation without having to depart in time to reach alternate accommodations. Motorboats, on the other hand, have greater ability to safely travel to adjacent campground areas in inclement weather and in a shorter period of time.

The Service met with the Washington State Parks and Recreation Commission (WSPRC) during the development of the draft CCP as it considered public uses, including camping, and their appropriateness and compatibility with the Refuge's purpose. Discussions resulted in the proposal set out in alternative B, the Service's preferred alternative which is supported by the WSPRC. We believe that alternative B is viable and the WSPRC has stated their willingness to continue to partner with the Service on public uses for Turn Island with the new stipulations. Under the preferred alternative, visitors arriving

by motor and sail power could still access the Island during the day and camp on their boats while secured to the mooring buoys provided by the WSPRC.

Comment: Another restriction that concerns me is the proposal to implement a reservation system. Again, I think the fire ban has already reduced usage enough to make this unnecessary. The nature of non-motorized boating makes inflexible advanced planning problematic because we are profoundly affected by both weather and tide. We need the flexibility to make decisions day-to-day.

Re: the negative impact of camping. I did not see anything in the report that quantified the negative impact of camping on Turn on any individual species. The ranger mentioned concern about alcohol-fueled parties on the beach - but also said that the ban on camp fires seemed to reduce the attractiveness of Turn to that type of camper anyway. I have never witnessed such parties, and neither had other campers I spoke with. I assume they do happen - but perhaps not as frequently as they are perceived to happen. In any case, my point is that you may have already solved 90% of the problem with the fire ban and I would urge you to allow time to see if that is not the case. I'm suspicious that local homeowners are pushing for a ban because they would like the area to themselves. If that is the case, I hope their interests will not be given precedent over the ordinary people who are able to responsibly enjoy the beauty of Turn Island under the current program.

Service Response: Independent to the CCP process, the Service worked with WSPRC to eliminate campfires on Matia and Turn Islands for several reasons. Island vegetation was being impacted by unauthorized wood cutting, and downed wood and driftwood, which are important wildlife habitat components, were being burned illegally. Fire ring evidence demonstrates that fires were being built outside of campfire containment structures. Due to fuel loads and dry climatic conditions, both Islands are at risk for catastrophic wildfires which could be devastating to wildlife and their habitats. However, the Service recognizes the need for Refuge visitors to prepare meals and continues to allow liquid and gel cook-stoves. The change is reflected in Objective 6.1, Strategy h.

After further review, including discussions with Washington State Parks and Recreation Commission personnel, the Service is not proposing to implement a camping reservation system for Matia and Turn Island campgrounds at this time. However, Refuge and State Parks personnel will continue to monitor camp site use. Should they find noncompliance issues such as excessive numbers of campers per site, camping in unauthorized locations, or camp site use resulting in unacceptable adverse effects to Refuge resources, initiating additional camping modifications, including a camp site reservation system, may be necessary in order to continue allowing camping on these islands.

Turn Island is open to all visitors for the purpose of appropriate and compatible wildlife-dependant recreation regardless of residential status.

29. Jean Public

Comment: I see no reason why an environmental impact statement was not done. I also think the entire area should be wilderness with few people allowed to enter. I object to your killing deer. Leave the place alone. They will work it out.

Service Response: Thank you for your comments. The Service considers an environmental assessment to be the appropriate NEPA document for this Comprehensive Conservation Plan because there will be no significant effects to the environment. 80 of the 84 islands covered by this plan are designated wilderness. The remaining 4 islands were reviewed and found to not merit wilderness designation. (See Appendix H). Impacts of deer on vegetation, soil stability, auklet nesting burrows, and disturbance to colony nesting species, coupled with the importance of the rhinoceros auklet colony to the North American population and its unique location, caused the Service to consider all possible conservation actions to protect auklet breeding habitat, including the reduction of deer on Protection Island. Black-

tailed deer are abundant in Northwestern Washington and removal of deer from Protection Island in order to protect this unique seabird habitat would have little impact on the deer population in the area. (See rationale for objectives 1.1 and 2.1.)

30. Andrew Reding

Comment: I am disappointed that there is still no commitment to preservation of the tufted puffins on Protection Island under any of the scenarios. Here is what I wrote earlier:

I am writing to propose a combined research and management plan to reverse the decline of tufted puffins at Protection Island National Wildlife Refuge. "The purposes of the Protection Island Refuge are to provide habitat for a broad diversity of bird species, with particular emphasis on protecting the nesting habitat of the bald eagle, tufted puffin, rhinoceros auklet, pigeon guillemot, and pelagic cormorant; protecting harbor seals' hauling-out areas; and providing for scientific research and wildlife-oriented public education and interpretation." The Protection Island National Wildlife Refuge Act (1982) mandated that tufted puffin preservation on the refuge is a matter of "particular emphasis."

Yet despite the fact that tufted puffin numbers have declined substantially, and that the tufted puffin is by far the species most likely to disappear from the refuge, no research is being done on the reason for the decline. Without such research, no management plan can be enacted to seek to reverse the decline and raise numbers beyond the dozen or so now present to a larger population less vulnerable to local extinction.

Service Response: Tufted Puffins are specifically addressed in Objectives 2.2 9.2, and 9.3. See also chapter 4, sections 4.8.5 and 4.8.6, which identify threats and the specific research questions identified in your comment above. Objective 9.2 proposes research on demographic parameters of Tufted Puffins that may be proposed to address your questions. Also see chapter 4, section 4.8.2 for a description of conditions and trends of puffins on Protection Island. Due to the fragile nature of the often sheer, sandy bluffs in which puffins burrow on Protection Island, no comprehensive studies have been conducted to determine the abundance of puffins on the island or assess the statistical significance of trends. However, results from incomplete surveys of the island over the past 30 years document a range of 32-100 individuals (Speich and Wahl, 1989). Recent surveys, also incomplete, resulted in a rough count of 35 individuals 2007 and 37 in 2008 (Scott Pearson pers. comm.).

Comment: Protection Island is roughly comparable to Eastern Egg Rock, Maine, which has a breeding colony of Atlantic puffins. Both island colonies are at the southern extreme of the breeding ranges of their respective puffin species. Research conducted at Eastern Egg Rock has established that the critical variable in the success of Atlantic puffin reproduction is curbing predation of puffin eggs and chicks by gulls, especially herring gulls. By actively chasing away the gulls during the critical weeks, researchers have succeeded in making the population of breeding Atlantic puffins soar to over one hundred at that location, where there had been none a quarter century ago.

The glaucous-winged gull is the almost identical counterpart of the herring gull in our ecosystem. Like the herring gull, its population has mushroomed as human activity has destroyed natural habitat favored by other species, and has opened up scavenging habitats suitable to gulls and crows. I must emphasize that the glaucous-winged gull is NOT one of the species listed in the act that created the refuge.

It is to me incomprehensible that current research at Protection Island focuses heavily on the glaucous-winged gull, which at this point has become a pest species reflective of human destruction of the natural environment, rather than the species at greatest risk, the tufted puffin. Worse yet, none of the research on the glaucous-winged gull seems to be oriented toward determining the extent to which it is reducing the breeding success of the species which were specifically mentioned as of "particular

emphasis" in the act that created the refuge, and particularly the most vulnerable of these, the tufted puffin. I believe such research is long overdue.

Research by itself is not good enough. We need to formulate a plan to try to rebuild the population of nesting tufted puffins to historic levels, if need be by culling deer and keeping gulls away from puffin nesting sites during the critical period from the laying of eggs to the departure of the juveniles for North Pacific waters. There is an additional advantage to the Refuge in doing this. Puffins are very popular with ecotourists, and thus contribute to the local economy by their very presence. In so doing, they help build public support for wildlife conservation in general.

Service Response: We agree that Tufted Puffins are a priority for conservation on the refuge; see Objective 9.2 and chapter 4, section 4.8.6. These sections address the specific research questions you list. Due to the fact that the species is listed in the enabling legislation for Protection Island NWR and identified as a State candidate for listing, the CCP specifically identifies the need for demographic studies of this species. The results of which will guide the development and implementation of management strategies for Tufted Puffins on Refuge Islands. We believe that the proposed research and monitoring strategies will guide the management process for all of our priority species.

Comment: I would also recommend research to determine whether the five dozen deer on the island are affecting tufted puffin reproductive success by collapsing their burrows. I would also like to propose that the priority for research should be projects designed to assist in the formulation of management practices that meet the primary goals of protecting the sensitive species on "Protection" Island.

Service Response: See Objective 9.2 for strategies that specifically address your concerns about assessing impacts to nesting habitats pre- and post-deer removal. Objective 9.1 describes goals and strategies for management practices of the research program.

31. Sally Reeve

Comment: *Preferred Alternative B appears as the best plan* for compliance with the USFWS mandates while at the same time accommodating traditional recreational uses (to the extent possible given ecological values at the sites). Preferred Alternative B's additional emphasis on public education of the San Juan Islands National Wildlife Refuge is a key component in the restoration, preservation, and protection of the Refuge. In most cases the public is willing to abide by restrictions but needs to be made aware of such restrictions. I believe the public would be willing to volunteer to assist in the restoration and clean-up needed at some sites. Preferred Plan B calls for increased staffing and increased research, which are good, but the volunteer component seems to be slighted. The USFWS has the opportunity to promote education of the sites and also get some work done if it brings volunteers into the effort and management.

Service Response: Thank you for your comments on the Draft CCP, and we note your support for the preferred alternative. It was not the intent of the Service to slight the potential partnerships with volunteers or their contributions. We have specifically identified volunteer needs in Objectives 6.2, 6.4, 7.2, and 8.3 and will continue to look for volunteer opportunities throughout the implementation of the final CCP.

Comment: I would recommend that signage be increased to include many of the Unnamed Rocks of size and topography which enables boating/kayaking access such as Aleck Rocks and Unnamed Rock 13 which are in the vicinity of where I live. Although this happens infrequently, at times boaters and kayakers will land on these islands/rocks and camp, start campfires, take driftwood, and move around boulders. These islands and rocks, though small and for many not of significance, do provide one of the

few spaces in the San Juans without human habitation. If a small boat or kayak could possibly land on a rock, they will. So consider that criteria when determining sign placements. If aware of the importance of these islands to the San Juan ecosystem and identification of which islands are part of the Wildlife Refuge, then the public will generally abide by the regulations to stay off these islands and rocks. But the public needs to have some way of easily identifying Wildlife Refuge sites.

I realize the difficulty in maintaining signs on the numerous rocks and islands, but perhaps this could be incorporated into the 'adopt a rock/island' program. And the signs do not need to be huge, just enough to identify the island as part of the San Juan Islands National Wildlife Refuge. Perhaps a small, unique logo for the San Juan Islands National Wildlife Refuge could be designed which would come to be recognized as the equivalent of the larger "Keep Off – Island Closed" type signs.

Service Response: The Service recognizes the need for better signage in the San Juan Islands NWR. Chapter 2, Objective 8.1, Alternative B, proposes creating a series of specialized signs to be used on Refuge Islands (larger size with text specific to island environments). The larger formats would allow bigger text readable by the unaided eye at greater distances. The text would be changed from the Service standard "Area Beyond This Sign Closed" to "Island Closed, No Entry". This would allow boaters to learn that the islands are closed before they approach, thus facilitating compliance and encouraging a larger wildlife disturbance buffer. These signs will have the U. S. Fish and Wildlife Service emblem on them to assist with identification. Maintaining these signs could indeed be incorporated into the proposed adopt-an-island program.

Comment: Along with increased signage there is a need for increased enforcement. If we observe a violation there is no local contact for us. The San Juan County Sherriff's office will not deal with USFWS properties. USFWS out of Sequim isn't very close and not around on weekends. Sharing office space with BLM on Lopez or other such arrangements throughout the San Juans would have a positive effect on the awareness of the Wildlife Refuge and the enforcement of your regulations to protect these areas.

Service Response: The Service recognizes the need for an increased presence in the San Juans and has identified strategies under Chapter 2, Objective7.2, Alternative B to accomplish this. These include creating additional staff positions, with a law enforcement component, and stationing them in the San Juans. The Service will continue to work with the San Juan County Sheriff's Office and other partners as identified in Objective 7.3 to patrol and report on non-compliance.

Comment: *Combined management with other agencies is essential*. As part of a group of citizens seeking National Conservation Area protection for BLM properties in the San Juans, I was surprised at the confusion over ownership of many of the rocks and reefs throughout the San Juans. This is not just the public's confusion, but differences between what various agencies believe they own and manage. It would be much easier and seemingly more efficient if the San Juan Islands National Wildlife Refuge were jointly managed with BLM. Or in the least, properties should be swapped between these two agencies where appropriate to make management more effective and efficient. *It is the outcome of protection of the resources and not the agency that is of importance.*

Service Response: While both Service and BLM lands are "public lands," the laws and policies under which each agency operates are different. The BLM is a multiple use agency while the Fish and Wildlife Service is not. National Wildlife Refuges are closed to the public unless opened where most BLM lands are open to the public. Joint management really would not be a viable option, but sharing resources including office space could be, as identified in Chapter 2, Objective 7.2. The Service would be open to discussions with BLM on transfer of their islands to the Service for inclusion to the San Juan Islands National Wildlife Refuge if they so desired.

Comment: And finally a couple of miscellaneous comments: Your efforts to restore and maintain *native grass habitats* are needed else this ecosystem will disappear. Your *restriction on but not total elimination of commercial use of sites is a good compromise.* Commercial outfitters can overwhelm a site, yet they too should have some access to San Juan Islands National Wildlife Refuge sites. Fees for commercial use also seem reasonable. *Your restrictions on Turn Island* (though eliminating the quick any time of day or night trip to a wilderness site for those from Friday Harbor) do *appear needed* to preserve the site from overuse.

Service Response: Thank you again for your comments and support of the objectives and strategies outlined in the Service's preferred alternative. Turn Island is not designated wilderness and was determined to not satisfy the minimum suitability criteria for "naturalness and wildness" standards for wilderness designation as outlined in Appendix H.2. Restrictions proposed for Turn Island apply to camping on the island. Day use trips can still be made by visitors arriving by any type of watercraft.

Comment: Please work with commercial ventures including whale watch operators to develop routes near San Juan National Wildlife Refuge Islands which allow for wildlife viewing without disturbance to that which is being viewed. Perhaps during nesting or seal pup season the boats could take slightly different routes so as not to disturb the birds and seals. The USFWS can be assertive in defining recommended routes and wildlife viewing practices so that operators do not get right up against Castle Island or cruise within a short distance of Swirl Rocks during certain times of the year or other similar disturbances in other areas.

Service Response: Human disturbance of wildlife on Refuge islands is a major concern of the Service. Numerous strategies outlined in Chapter 2, Objectives 7.1, 7.2, 7.3, and 8.2, Alternative B, seek to address this issue. Strategy "a" under Objective 7.3 specifically addresses our outreach with wildlife tour groups and others.

Comment: As to Unnamed Rock 13, we were unaware of USFWS ownership of the north island as it isn't an island but is connected to our property except at high tide. The large island in the bay used to have USFWS signage. Since we have placed conservation easements on our property, which we think includes 'your' north island, the outcome is likely the same as under USFWS. Both of our objectives are to protect the site. But please contact us to discuss the ownership issue.

Service Response: The Service will contact you prior to any signing of these islands and work with you on ownership questions and issues.

32. Tom Reeve

Comment: Thank you for letting me comment on your proposed alternatives. As a resident of San Juan County and a direct neighbor to some of these islands (including site 13, which is directly outside my window), this plan discusses lands that are very important to me. I strongly support the preferred alternative (B) as providing the most appropriate management for these lands. I'd like to specifically commend the alternative for improving the management of invasive plants and animals, improving signage and interpretive ability and promoting proper monitoring and assessment. Improved signage on these islands is a very important management goal. Alternative B does a good job of approaching this. I'd like to see an even stronger effort to ensure that interpretive and education signage is placed where most likely to be seen by people who will venture into this landscape. You discuss placing interpretive signs at marinas, but I think smaller boat launches (e.g., county boat ramps and docks) and popular kayak launch

sites (e.g., county parks) are also important places for this sort of signage. Most of the county parks on my home island of Lopez look out onto wildlife refuge islands. As people stand on shore and look at the islands is a perfect time to educate them on the value of the sites and their fragile nature. Likewise, many people launch their kayaks from these locations and reminders as to proper etiquette around the refuge would be timely.

Service Response: Thank you for your review and comments on our Draft CCP. The Service recognizes that there are numerous locations in the San Juan Islands where interpretive panels or posters could be sited and will work with San Juan County on placement at boat launches and parks. Strategies under Objective 7.1 in Chapter 2.5 in the CCP were changed to reflect this.

Comment: I encourage the USFWS to continue to collaborate with local partners in future management decisions and operations. The groups removing derelict fishing gear are mentioned, as is the Island Oil Spill Association – both key partners for improving and protecting the habitat in the refuge. Concern is expressed in your document about fire management, particularly on Turn and Matia Islands. I'd encourage deep discussions with the fire departments on San Juan and Orcas islands who would be the first responders – they are thinking about these issues for other neighboring islands and a good partnership with them would be valuable. An area that may be beyond the scope of this exercise but one that I feel is very important is examining the relationship between these holdings and similar holdings in the area. Two specific examples come to mind:

1) Turn Island is described as having very little wildlife beyond raccoons. It also appears to be quite the management headache given the popularity of camping on the island and the challenges of balancing that use with the habitat values of the island. If there is some way of turning complete management of the island over to State Parks, possibly via a land swap with places like Iceberg Island which they own but have no recreational users, you may be able to find the best solution for both the land and the community. I don't know the complications this would entail and whether congressional action would be necessary to 'remove' lands from the refuge, but it seems like a much more appropriate use of our limited management resources.

2) The BLM owns scores of similar rocks and islands in the San Juans. A few of these islands are managed, with State Parks, for recreation but the majority are uninhabited and unused rocks with very similar habitat and conditions to the islands in the refuge. Joint ownership, joint management, or at least collaborative management between BLM and USFWS seems very appropriate and would minimize the chance that the public will be confused by differing rules from different federal agencies on seemingly identical islands.

Service Response: Thank you for your comment. Objectives 1, 6, and 9 describe various partnership opportunities and strategies the Service plans to use to reach our goals of protecting and restoring habitat on the refuges. The Service is not interested in reducing the number of islands in the San Juan Islands National Wildlife Refuge and an Act of Congress is necessary to remove lands from the National Wildlife Refuge System. The Service acknowledges that there are limited management resources, thus making it incumbent that we continue to coordinate management activities with other Federal agencies, Washington State Parks, and other partners. Island habitats are rare to begin with and those set aside to protect habitat needed by wildlife species inhabiting the Salish Sea even more so. Cumulative impacts to habitats in many areas surrounding the Salish Sea have reduced their value for wildlife making it even more critical to retain what little is left. The Service would be open to discussions with BLM on transfer of their islands to the Service for inclusion to the San Juan Islands National Wildlife Refuge if they so desired.

33. Kim Secunda

Comment: I vote for Alternative B and am thrilled that there will be protection and care and interesting research and interaction with this magnificent ecosystem.

Service Response: Thank you for your support of the management goals outlined in our preferred alternative in the document.

34. Forest Shomer

Comment: This is a letter of support for Alternative B. In particular, I urge the maximum restoration of the native strand of Smith and Minor Islands. These lonely rocks are often overlooked in discussion about the inland waters and of course they have no resident advocates for their protection and upgrading. Due to their isolation, they have great potential to become invasive-free refugia and demonstration sites for what is possible on other uninhabited rocks closer to populated areas.

Service Response: Thank you for reviewing the draft CCP and your support of the management goals outlined in our preferred alternative. The restoration outlined within all island habitats using only native species, as described in several historical records, is the foundation for this vision. Castilleja levisecta is also identified as one of our targeted re-introductions as described in Chapter 2.5 Goals, Objectives and Strategies, specifically found in goal 3, objective 3.1, strategy e. Along with the restoration of the native plant communities will be the use of integrated pest management practices to monitor and control non-native plant and animal species. This will include non-native rabbits. These actions are described throughout Chapter 2.5 in goals 1-5.

Comment: I also support wholeheartedly the removal of deer from Protection Island. Deer are rampant on the adjacent mainland and because they are not predated significantly, their populations are consistently at a maximum level on the Olympic Peninsula northern extremities, creating great pressure on the regeneration of native plant species. In my observation, they are suppressing all Castilleja spp. populations on the shorelines nearest to Protection Island, which inhibits the potential for success at reintroducing Castilleja levisecta as is being tried on central Whidbey Island. Removal of deer from the island will 'level the playing field' for native species such as Castilleja.

But even deer removal will not reverse the trend if feral rabbits are not also controlled. I don't know if rabbits are currently rampant on Protection Island, but at nearby sites including Keystone Spit on Whidbey Island, and Joseph Whidbey State Park, there has been an unchecked explosion of rabbit populations for a number of years, decimating the herbaceous layer of plants at both sites. Keystone is turning into a virtual 'desert' due to the decline of important species such as Allium cernuum and Plectritis congesta, which are eaten to the ground before they can seed each year. Jos. Whidbey is losing its herbaceous saltmarsh species for the same reason.

If the same condition exists on either or both Protection and Smith/Minor Islands, efforts to stabilize native plant populations will not likely succeed. There are examples of the complete removal of feral rabbits from islands offshore Australia, so it can be done!

Service Response: The Service understands your concerns regarding impacts to habitat and native plant diversity from deer and rabbit populations on islands. We have outlined in Chapter 2.5 in the rationales of Objectives 1.1 and 2.1 our concerns for restoration of the spit, sandy bluff, grassland/savanna, and forested habitats with the existing deer population. The Service will work with Washington Dept. of Fish and Wildlife and the Point No Point Treaty tribes in the development of a step-down plan to remove deer from Protection Island. Rabbits do not occur on Protection Island. These concerns are further described within Goals 1-4, which also include the herbivory of rabbits. Currently, we have no confirmed

occurrence of rabbits on any of the islands within San Juan Islands NWR. See above response for management proposals concerning non-native rabbit removal.

35. Karl Spees

Comment: In reference to the deer problem on Protection Island. As I understand it is an area totally controlled and restricted by government policies and rules. As wildlife managers if you can't resolve this problem without public input, you need to resign and let someone who can, do the job. I know how inept the government has been in dealing with 'Hershel' so I don't have high expectations of my government officials.

Service Response: The National Environmental Policy Act (NEPA) requires that all branches of the government give proper consideration to the environment prior to undertaking any major federal action that significantly affects the environment. Environmental Assessments (ESs) and Environmental Impact Statements (EISs), which are assessments of the likelihood of impacts from alternative courses of action, are required from all Federal agencies. Integral to EA or EIS development is the public participation process. Public involvement is summarized in Appendix K - Coordination, Consultation, and Compliance.

Comment: As to the San Juan Islands. The guiding principles I would use are: Do we have to borrow money or raise taxes to achieve these 'saving the planet' agendas or to monitor and maintain these areas?

Service Response: Actions (strategies) will be implemented over the life of the CCP, contingent upon available funding. Funding for the Refuges is received through the Federal budget process. The Service will also seek grants and expand partnerships to implement some of the actions identified in the CCP.

Comment: Article 1. Section 1. Of the Washington State Constitution
Political Power: All political power is inherent in the people, and governments derive their just powers from the consent of the governed, and are established to protect and maintain individual rights.
What do these plans have to do with protecting and maintaining individual rights? If these plans are in conflict with private property owners, the rights of the private property owners should prevail.

Service Response: The CCP pertains to National Wildlife Refuge lands and thus does not conflict with private property rights.

Comment: I do not believe in no rules or policies protecting our habitat and wildlife but I also am alarmed by the current assault by our own governments to 'save the planet' and putting the 'rights of fowl, fish, and beast' above the rights of the citizens. Our wildlife and habitat needs must be balance with those of our citizens.

Footnote: The overreaching and taking of our private property rights in the past year by our government and non-representative government agencies has been overwhelming. Because of the overwhelming nature of the assaults on our Constitutional private property rights, my comments on your plans are generic. As government official being supported by citizens tax dollars you have an obligation to act in the best interest of the citizens FIRST!

Service Response: So noted. Thank you for your comments.

36. Eleanor Stopps

Comment: Thank you for the opportunity to respond to your Draft Alternative Summary Table for Protection Island and San Juan Islands - my comments pertain only to Protection Island. I am *strongly* in favor of Alternative A - (Current management - No action) for the following reasons:

I feel that *all* the categories listed are more than adequately covered by this plan.

Service Response: Thank you for taking the time to review and comment on the Draft CCP.

Comment: I oppose other plans that prescribe burning. I feel this is too risky due to lack of water on the island.

Service Response: Prescribed fire is just one of the tools we would look at employing as we explore the possibility of restoring non-native vegetation habitats on Protection Island to native species. Fire may clear vegetative debris and stimulate any native seed stock that might be present. The Service would test fire as a tool on small plots and monitor results prior to any large scale use. Before fire can be used, a prescribed fire plan would be developed laying out what conditions (weather, wind, humidity, fuel moisture, staff and equipment) must exist prior to burning. We share your concern about fire but feel if done properly and within prescription it has the potential to benefit restoration efforts.

Comment: I oppose removing (killing) the deer on the island. Rhinoceros auklet authorities that I have spoken with feel that the deer are *not* having a detrimental impact on the auklets and that hunting and killing the deer would cause more damage than any the deer might cause. I am told that auklets often cave in their own burrows or choose new ones frequently. *If* there is any decline in auklet populations, it could be attributed in part by predation by increased numbers of eagles.

Service Response: When Protection Island was established as a National Wildlife Refuge there were no deer on the island. Legislation that established the refuge noted: "The purposes of the refuge are to provide habitat for a broad diversity of bird species, with particular emphasis on protecting the nesting habitat of the bald eagle, tufted puffin, rhinoceros auklet, pigeon guillemot, and pelagic cormorant; to protect the hauling-out area of harbor seals; and to provide for scientific research and wildlife-oriented public education and interpretation" (96 Stat. 1623). Protection Island NWR is an extremely important seabird nesting area. The majority of seabirds nesting in Puget Sound nest on this one island and the rhinoceros auklet colony is one of the largest in North America and only one of two (the other is Smith Island) in inland waters. There is a difference of opinion among seabird biologists as to the impacts of deer on the rhinoceros auklet colony but impacts do occur. The Service believes that due to the importance of this island as a significant seabird nesting site, impacts from deer need to be addressed. Removal of deer will reduce the number of caved in auklet burrows, eliminate disturbance in the auklet colony by deer bedding down in the colony, reduce erosion in the colony areas from deer trail establishment and heavy use, and eliminate disturbance to the glaucous-winged gull colony as they traverse through that area. In addition, restoration of native vegetation habitats would benefit without the added stress of deer use.

Comment: Even existing research should be *carefully* monitored. If it does *not* benefit the species being studied, it should *not* be done; for example one study that took place several years ago placed *additional* eggs and or chicks in nests to see if the birds would resort to cannibalism under stress! How awful! It resulted in horrible devastation! I personally viewed the large study site from an overlooking bluff. I approve of the research done recently by Jim Hayward and Shandelle. I would appreciate being kept informed on the progress of this plan. All the additional surveys and proposals just *add* to *more* human disturbances. The less human activity is the proper choice. The island is best left alone at much as possible.

Service Response: The Service acknowledges your concern about human disturbance and concurs. Objectives 9.1 through 9.5 outline our proposed management of surveys and research on the islands. Research and surveys conducted on the islands are to gather information and data on the natural resources and all research and studies are undertaken with great care.

37. Peter van der Linden

Comment: I have been reading through the Protection Island and San Juan Islands National Wildlife Refuges Administrative Draft CCP/WSP/EA and feel I need to lobby strongly to prevent the unnecessary and un-thoughtful consequences of further limiting or even preventing camping on Turn Island and installing a reservation system there. One of the most important assets wildlife preservation has is interested and active participants. Allowing camping and access to these islands creates a unique way for people to experience wildlife in the islands and for people to see firsthand what is at stake. I take my children there and know personally what an impact camping in these islands has had. It is from experiences such as an overnight stay on Turn Island that peoples' decisions and even careers are influenced for life.

My youngest son was at Turn Island recently and spent a number of days camping in various places. He talks incessantly about this trip and about the wildlife, including the orca he saw. I know that he will always treasure these memories and will be a strong advocate for the preservation and protection of these natural resources all his life. I do not know the full impact of having motorized boats visit these islands, but think that small motorized boats should be able to stop on Turn Island. Given that there is no water on Turn Island, no dock, and no fires allowed, I don't see that there is any threat of over-visiting.

Service Response: Thank you for reading the draft comprehensive conservation plan and for your comments. The Service agrees that "one of the most important assets wildlife preservation has is interested and active participants". There is no doubt that allowing access to Matia and Turn Islands is a valuable way for visitors to experience wildlife. The National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57) recognizes that refuges are set aside for "wildlife first" while at the same time identifying compatible wildlife-dependent recreational uses as the priority general public uses of the Refuge System. These uses must be found to be compatible and can include hunting, fishing, wildlife observation, photography, environmental education, and interpretation. Camping is not identified as a wildlife-dependent public use but the Service felt that with some modifications to the current program, it could be made appropriate and compatible and support wildlife observation, photography, and interpretation. Because human-powered watercraft are slower than motorboats, allowing these visitors to camp on Turn Island facilitates their opportunity to safely reach the Island and have sufficient time to enjoy the Refuge's wildlife-dependent recreation without having to depart in time to reach alternate accommodations. Motorboats, on the other hand, have greater ability to safely travel to adjacent campground areas in inclement weather and in a shorter period of time.

The Service met with the Washington State Parks and Recreation Commission (WSPRC) during the development of the draft CCP as it considered public uses, including camping, and their appropriateness and compatibility with the Refuge's purpose. Discussions resulted in the proposal set out in alternative B, the Service's preferred alternative, which is supported by the WSPRC. We believe that alternative B is viable and the WSPRC has stated their willingness to continue to partner with the Service on public uses for Turn Island with the new stipulations. Under the preferred alternative visitors arriving by motor and sail power could still access the Island during the day and camp on their boats while secured to the mooring buoys provided by the WSPRC.

Comment: I am concerned that limiting the camp sites or installing a reservation system would be an undue burden on people using human-powered boats to get there. Paddling and sailing are highly

dependent on weather and further complicating staying on the islands makes it more risky (prompting visitors to arrive and leave under tighter conditions and perhaps even in adverse weather). I fully support Alternative A and support some of Alternative B, with suggested exceptions being the reduced camping facilities, a reservation system, and limiting visitors by small motorized boat.

Service Response: The Service is proposing to remove five of thirteen campsites on Turn Island. This will reduce the area of wildlife habitat disturbed from camping while still maintaining a quality experience by not stacking campers on top of each other. Within four miles of Turn Island there are 2 State Parks with 13 campsites and 2 county parks with 20 campsites. Currently there are more than 400 public camping sites and nearly as many private sites in the San Juan Islands. Removal of these 5 will result in an overall reduction in campsites of less than1 %.

After further review, including discussions with Washington State Parks and Recreation Commission personnel, the Service is not proposing to implement a camping reservation system for Matia and Turn Island campgrounds at this time. However, Refuge and State Parks personnel will continue to monitor camp site use. Should they find non-compliance issues such as excessive numbers of campers per site, camping in unauthorized locations, or camp site use resulting in unacceptable adverse effects to Refuge resources, initiating additional camping modifications, including a camp site reservation system, may be necessary in order to continue allowing camping on these islands.

38. Katy Wilkens

Comment: I have received the draft CCP/WSP/EA Alternatives for Protection Island and the San Juan Islands National Wildlife Refuges, dated August 2010. I have been arriving at Turn Island, by inflatable Zodiac, or by kayak, for over 35 years. I haven't missed a summer, and most years we come several times. I raised both my boys on trips to Turn Island.

Once a year I bring about 10-15 Boy Scouts, aged 13-18, from my husband's Boy Scout troop to Turn Island. While there we have a class on seaweeds taught by a PhD in Botany, the scouts earn their Mammal Study merit badge, they watch the night sky, they kayak round Shaw Island, down to Cattle Point, and up to Stuart or Posey Island. Before they leave, they clean up the island of garbage and debris. In short, they do everything your mission describes "to understand and conserve this habitat for the benefit of present and future generations of Americans."

My concerns are as follows, and concern primarily Turn Island:

1. If it is truly Fish and Wildlife Service's intent to use Turn Island as an 'educational site', as I was told by Mr. Lorenz Sollmann when I spoke to him last week, then I fail to understand how limiting small power boats at Turn Island will improve the public's understanding of the importance of refuges.

2. There are very few power boats that land on the island because a) there is no water, b) there is no dock, and now c) there are no fires allowed. The power boats that do arrive at Turn Island are typically small boats that don't have room for sleeping. They pull up to the beach, and beach themselves, or use their small dingys to row to the beach. Once they hit the beach, they are no different than kayakers. Again, if your goal is to use Turn Island as an educational site, how is limiting the power boaters helpful? Or do they not get the education because they don't have a kayak?

Service Response: The Service is not closing Turn Island to wildlife-dependent public use, and all manner of watercraft would be allowed to land and visit the island during the day . Camping on the island would be limited to visitors arriving by human-powered watercraft. Because human-powered watercraft are slower than motorboats, allowing these visitors to camp on Turn and Matia Islands facilitates their opportunity to travel greater distances and allows them sufficient time to enjoy the refuge's wildlife-dependent recreation once they arrive. Motorboats have greater ability to travel to adjacent campground areas in inclement weather and in a shorter period of time. Motor boaters would

still be allowed to tie up to Washington State Parks mooring buoys and camp on their boats at Turn and Matia islands.

Comment: 3. When I asked Mr. Lorenz Sollmann how many power boats spent the night at Turn Island, he could not answer my question. Nor could he tell me how many kayakers or sailboats landed there in a year, or what percentage of use was power boats vs. kayaks or sailing dingys. I was astounded that the F&WS was going to make decisions about how people arrive at Turn Island without any data at all. As a scientist, I find this lack of data to make decisions particularly disconcerting in an organization which should be driven by science and the scientific method.

Service Response: Washington State Parks collects data on day use and camping on Turn and Matia Islands and supplies the Service with this data. Numbers from 2008 show Turn Island receiving 10,248 day use visits and 3,061 camping visits.

Comment: 4. In speaking with the park ranger at Turn Island just a few weeks ago, while camped there, he told me that if the power boats were not allowed to land on Turn Island, there would not be enough use of the island to justify sending a ranger out there to collect fees, and they would not be able to allow camping. So, plan B automatically becomes plan C if you don't have enough campers. If your intent is to keep people from learning about the San Juan Islands, this plan will do a good job of that.

Service Response: The Service has had a long-term relationship with Washington State Parks on Turn and Matia Islands which is formalized in a Memorandum of Understanding. They established and maintain facilities needed for day use and overnight camping. The National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57) recognizes that refuges are set aside for "wildlife first" while at the same time identifying compatible wildlife-dependent recreational uses as the priority general public uses of the Refuge System. These uses must be found to be compatible and include hunting, fishing, wildlife observation, photography, environmental education, and interpretation. Camping is not identified as a wildlife-dependent public use, but the Service felt that with some modifications to the current program, it could be made appropriate and compatible and support wildlife observation, photography, and interpretation. The Service met with Washington State Parks during the development of the draft CCP as we looked at camping and its appropriateness and compatibility. Discussions resulted in the proposal set out in alternative B, the Service's preferred alternative. In further reviewing the issue and discussing with Washington State Parks personnel, the Service is not proposing to implement a camping reservation system for Turn and Matia Island campgrounds at this time. However, Refuge and State Parks personnel will be monitoring camp site use and should they find non-compliance in numbers of campers per site, camping in unauthorized locations, or camp site use resulting in unacceptable adverse effects to Refuge resources, additional camp site use modifications, including a camp site reservation system, may be necessary to initiate in order to continue to allow camping to occur on these islands. We believe that alternative B, with or without the reservation system, is a viable alternative and Washington State Parks has stated their willingness to continue to partner with the Service on public uses for Turn and Matia Islands with the new stipulations.

Comment: 5. Currently, the San Juan Islands are for the rich. If you have a 3 million dollar home, you can enjoy them. If you have a big boat, and can sleep on it, you can enjoy them. If you don't have much money, you can stay on Turn Island or Matia, but with your "Plan B' you will effectively remove too low cost camping sites for people in small boats. If you lock up the heritage of the San Juans, only the wealthy will be able to enjoy this beautiful spot. Is that what you want? Do only the wealthy get to enjoy the fishing, the photography and the wilderness? Is that your mandate?

Service Response: The Service is proposing to remove 5 of 13 campsites on Turn Island. This will reduce the area of wildlife habitat disturbed from camping while still maintaining a quality experience by

not stacking campers on top of each other. Within four miles of Turn Island there are 2 State Parks with 13 campsites and 2 county parks with 20 campsites. There are over 400 public camping sites in the San Juans and the removal of these 5 will result in a reduction of less than 1%**.** The Refuge is open to all regardless of economic status.

Comment: 6. I am trying to understand, after reading all 564 pages of your plan, how the method at which you arrive at Turn or Matia Island affects the refuge? If you don't want people approaching the other 79 refuges in the San Juans, why would you make it so hard to visit the one that is accessible, has a good beach, and good camping? At Turn Island, the public can learn about why the other refuges need to be protected, and what they look like, without trying to land on them.

Service Response: The Service reiterates that day use of Turn and Matia Islands would be open to all visitors arriving by all types of watercraft. Figures supplied to the Service by Washington State Parks show the vast majority of visitors are day use visitors who would benefit from an enhanced interpretive and environmental education program. The Service identifies strategies to accomplish this in Chapter 2, objective 6.2.

Comment: 7. I can see that you want to close the beach on the south side, but why are you decreasing the campsites from 13-8? They take up a very small part of the island. It appears all you are doing is limiting an already scarce resource even more, and limiting it to fewer people.

Response: Reducing the number of campsites will reduce the area of disturbance from camping, allow vegetation and soils to recover in those areas, and restore wildlife habitat. The camping experience will be enhanced with fewer sites and campers not being crowded on top of one another. In addition, as stated above, there are over 400 public camping sites in the San Juan Islands available for visitors.

Comment: 8. In talking with Mr. Sollman it was astounding to me how little your group knows about Turn Island. He tells me that the plant and wildlife there has not been surveyed, you don't know how many people use the island, how they arrive, or how long they stay. It appears you are taking a 'one size fits all' approach. Solutions for your small, rocky outcrop areas, which are great for seals and birds, be the same plan as Turn and Matia Islands, which are ideal for people to take photography, fish, and experience unique plant and wildlife is ridiculous. Is the only way you want people to experience wildlife in the San Juans from the deck of a yacht?

Response: Data on Turn and Matia Islands have been collected by the Service and its partners for a number of years. Annual wildlife inventory surveys have been conducted by the Service. Bald eagle nesting surveys have been conducted by the Service and Washington Department of Fish and Wildlife (WDFW). Botanical surveys have been conducted by the University of Washington, The Nature Conservancy of Washington, Washington Native Plant Society, and WDFW. The Service acknowledges that information on Turn and Matia Islands is incomplete and has identified additional study and survey needs in Chapter 2, Objectives 1.3, 3.3, 4.2, 5.2, 9.2, 9.3, 9.4, 9.5 and 9.6.

Comment: 9. A reservation plan for Turn Island camping is not workable for small power boaters or kayakers, who are so dependent on the weather. We spent a very long Labor Day weekend at Turn one year, because of the gale force winds that arrived and stayed for 3 days. No reservation system would have allowed us to shelter from a bad storm there. Likewise, kayakers are at the mercy of wind, tide, and their own strength, sometimes we get where we are going on time, and sometimes we don't. Now let's add the stress of a reservation to meet, or not going to Turn because we don't know if there is an open campsite for the 12-15 scouts who typically attend this outing.

10. The reservation system on Posey Island is an example of how poorly the Parks Departments reservation system works. We tried to reserve 7 different dates for Posey, were never able to get one that fit our group's schedule. Then we arrived on Posey Island, and there was an open slot, but only for one campsite, not two, so we had to split our group, and the stronger paddlers, in the dark, had to paddle out to Stuart Island. If someone had drowned, whose fault would that have been? Obviously those of you doing this planning are not kayakers.

Service Response: In further reviewing the issue and discussing with Washington State Parks personnel, the Service is not proposing to implement a camping reservation system for Turn and Matia Islands campgrounds at this time. However, Refuge and State Parks personnel will be monitoring camp site use and should they find non-compliance in numbers of campers per site, camping in unauthorized locations, or camp site use resulting in unacceptable adverse effects to Refuge resources, additional camp site use modifications, including a camp site reservation system, may be necessary to initiate in order to continue to allow camping to occur on these islands. The Comprehensive Conservation Plan and Wilderness Stewardship Plan do not include Posey Island.

Comment: 11. This evaluation and public comment process seems to have been set by your agenda. It appears that by selecting meeting times on San Juan Island, and Port Angeles, the opportunities to discuss your plan have been very limited. The public meetings, where times and locations were set so that anyone attending from any metropolitan center would have to miss work, or pay for an overnight hotel, are just further examples of the way your organization is 'meeting the letter of the law', without meeting the intent. When I requested of Mr. Ryan that a meeting be scheduled in Seattle or over a weekend on San Juan, he refused.

Service Response: Public involvement is summarized in Appendix K - Coordination, Consultation, and Compliance. Public meetings were held in Friday Harbor, Washington, the county seat for San Juan County, and Port Townsend, the county seat for Jefferson County. The majority of San Juan Islands NWR is located in San Juan County and Protection Island NWR is located in Jefferson County. Public meetings were only one method the public was invited to participate in the planning process. Three planning updates were mailed out requesting public input, each containing a phone number, fax number, email address, U.S. postal address and website.. Written and verbal comments as well as those received at public meetings were all considered in the development of the CCP. The CCP was not finalized until all comments to the Draft CCP were received and considered.

Comment: 12. My last concern is directed at Mr. Kevin Ryan himself. I have found him to be particularly less than helpful. I emailed him about 2 months ago, verifying that I could still take Scouts to Turn Island this August, (since no updated information had been sent in over a year). Mr. Ryan informed me that we could camp at Turn, but neglected to mention there are no fires allowed there now. So, I had 12 scouts who brought meals to cook over a campfire, who had no stoves. This is simply another example of Mr. Ryan's lack of consideration or concern for the public. I'd love to stick him on an island with 12 hungry teens and no way to cook and see how he handles it.

Service Response: E-mail records show correspondence between you and Project leader Ryan on 15 April 2009 and 25 January 2010. In addition Mr. Lorenz Solleman, Deputy Project Leader, discussed questions regarding the Draft CCP with you on 23 August 2010. Mr. Ryan explained the different alternatives and their impacts on camping on Turn and Matia Islands. He also noted that no changes would be implemented until after the CCP was finalized. Independent of the CCP process, the Service had been working with Washington State Parks to eliminate campfires on Matia and Turn Islands. Island vegetation was being impacted by unauthorized wood cutting. Down wood and driftwood, which are important wildlife habitat components, were being burned. Mr. Ryan thought when he emailed you that the no camp fire regulation had been implemented at both islands but in fact it had been implemented

only at Matia Island. He acknowledges your frustration with his mixed message of not implementing CCP strategies until finalization of the CCP and apologizes for the mix up regarding eliminating campfires.

Comment: I would like to suggest that you modify your 'Plan B,' to include allowing power boats to land at Turn Island for camping. If that isn't possible, then I suggest you return to plan A, and leave things the way they are. I would also suggest, since it seems that plan B is your preferred alternative, that you do not institute a reservation system on Turn Island, unless you further want to diminish the availability of such a beautiful place to teach young people about the San Juans. It is impractical for human-powered vessels to meet reservation dates and times without endangering themselves, or foregoing experiences because of a bureaucratic reservation system. I also request that the campsites be left at 13, and if you feel the need to move the two on the south side of the island, that you move them, rather than eliminate them.

I appreciate your lofty goals, but shutting down more of these special places will not make people more appreciative of the special place that is the San Juans, indeed, it will make them less so, a direct conflict to your mandate. I'd love to talk to a real person about this, but continue to be amazed at the lack of accountability by Mr. Ryan (whom I have sent several emails to).

Service Response: Your concerns about implementing a reservation system for camping on Turn and Matia Islands and the reduction in the number of campsites are addressed above. Under the preferred alternative, visitors arriving by power or sail boats at Turn Island can camp on their boats while secured to Washington State Park mooring buoys. Visitors at Matia can camp on their boats while using mooring buoys or the dock.

39. Ulrich Wilson

Comment: This letter is in response to your recently mailed draft of the Protection Island and San Juan Islands National Wildlife Refuges Comprehensive Conservation Plan (CCP). The purpose of this letter is to provide comments and to inform you why I am not reviewing this document the way I normally would, as a well known scientist, any credible scientific document that deals with areas of my expertise.

This draft CCP is plagued by an almost total lack of scientific credibility. There has been a major lack of making use of the best available science. This document does not reflect the reality in the field. Published biological information is either missing or the findings have only been superficially quoted without use of specific findings as they relate to the refuges and their wildlife. Much unpublished information on refuge wildlife populations (although available) is entirely missing or misrepresented. There are also many gross errors and deliberate misrepresentations or omissions of facts. Earlier comments on this CCP by knowledgeable individuals were apparently given no consideration. This draft CCP is unfit for circulation.

Service Response: We respectfully disagree with your assertion regarding the lack of scientific credibility of the Draft CCP/WSP/EA. The Service did use the best available science while developing the CCP. Your assertions of errors, omissions, and misrepresentations are not substantiated with any specific examples that would compel us to revise the CCP. The Service consulted with many natural resource professionals in the process of developing the CCP (see Appendix K). We did consider all comments we received regarding the CCP, including your earlier comments.

Comment: This document is clearly the product of politically correct bureaucrats that have no expertise with the biology of the wildlife populations of the refuges or the processes that are taking place on and around the refuge islands. The authors are also either unfamiliar with the scientific process, or have a disdain for science. Clearly the necessary homework for this document was not done.

I suggest you re-write this draft CCP and this time make an honest effort to produce a workable plan and put science back into the process. If this is beyond the ability of the current preparers, as it appears to be, I suggest you find and use resource experts that can assist you.

I am so disturbed by the lack of credibility in the CCP process that I will write a manuscript for publication dealing with this issue. I will use both this CCP and the earlier one for the outer coast refuges, when I was still the Wildlife Biologist for the Washington Maritime National Wildlife Refuge Complex, as prime examples. Our National Wildlife Refuges deserve to be managed with greater integrity and professionalism.

Service Response: We disagree with your accusations regarding the integrity and professionalism of the Service employees who prepared the Draft CCP/WSP/EA. The preparers (see Appendix K) are experienced and qualified professionals. As stated above, the preparers also consulted with many other natural resource professionals, including seabird experts, in the process of developing the CCP. We also disagree with your assessment of the document and you have not provided any specific examples of where it might be improved. We look forward to reading your future manuscript.

40. Dr. Fran Wood

Comment: I am in support of Alternative B. I am concerned about eagle predation and disturbance of deer to the Violet Spit gull colony on Protection Island NWR. However, I note that eagle control was not considered and support the Service in that decision. I support habitat management for gulls in the Violet Spit gull colony.

I suggest you use a team of trained Wildlife Agents for deer control. I am not favor of a special hunt that may damage burrow nesting habitat.

Service Response: Thank you for your review and comments on the Draft CCP. We appreciate your support of Alternative B and specific objectives relative to gull habitat management and control of eagle predation.

In collaboration with WDFW and Treaty Tribes, a separate step-down management plan will be developed to address control of deer on Protection Island where all methods will be evaluated.

41. Bill Zinck

Comment: My son has been going to Turn Island via kayak and camping every year for the last six years. We implore you to keep the island as it is presently used. PREFERENCE - Return to plan A, and leave things the way they are. SECONDARY PREFERENCE - Modify your 'Plan B' to include allowing power boats to land at Turn Island for camping. Without this, the island will be unsupervised, and eventually be closed for all uses.

Service Response: Thank you for reading the draft comprehensive conservation plan and for your comments. The National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57) recognizes that refuges are set aside for "wildlife first" while at the same time identifying compatible wildlife-dependent recreational uses as the priority general public uses of the Refuge System. These uses must be found to be compatible and can include hunting, fishing, wildlife observation, photography, environmental education, and interpretation. Camping is not identified as a wildlife-dependent public use, but the Service felt that with some modifications to the current program, it could be made appropriate and compatible and support wildlife observation, photography, and interpretation. Because human-powered watercraft are slower than motorboats, allowing these visitors to camp on Turn Island facilitates their opportunity to safely reach the Island and have sufficient time to enjoy the Refuge's wildlife-dependent

recreation without having to depart in time to reach alternate accommodations. Motorboats, on the other hand, have greater ability to safely travel to adjacent campground areas in inclement weather and in a shorter period of time.

The Service met with the Washington State Parks and Recreation Commission (WSPRC) during the development of the draft CCP as it considered public uses, including camping, and their appropriateness and compatibility with the Refuge's purpose. Discussions resulted in the proposal set out in alternative B, the Service's preferred alternative which is supported by the WSPRC. We believe that alternative B is viable and the WSPRC has stated their willingness to continue to partner with the Service on public uses for Turn Island with the new stipulations. Under the preferred alternative, visitors arriving by motor and sail power could still access the Island during the day and camp on their boats while secured to the mooring buoys provided by the WSPRC.

Comment: A reservation system is completely unworkable for human-powered craft that are at the mercy of weather, tides, currents, etc.

Service Response: After further review, including discussions with Washington State Parks and Recreation Commission personnel, the Service is not proposing to implement a camping reservation system for Matia and Turn Island campgrounds at this time. However, Refuge and State Parks personnel will continue to monitor camp site use. Should they find non-compliance issues such as excessive numbers of campers per site, camping in unauthorized locations, or camp site use resulting in unacceptable adverse effects to Refuge resources, initiating additional camping modifications, including a camp site reservation system, may be necessary in order to continue allowing camping on these islands.

Comment: I also request that the campsites be left at 13. Move campsites if necessary, don't remove them.

Service Response: The Service is proposing to remove five of thirteen campsites on Turn Island. This will reduce the area of wildlife habitat disturbed from camping while still maintaining a quality experience by not stacking campers on top of each other. Moving campsites would increase the area of wildlife habitat disturbed. Within four miles of Turn Island there are 2 State Parks with 13 campsites and 2 county parks with 20 campsites. Currently there are more than 400 public camping sites and nearly as many private sites in the San Juan Islands. Removal of these 5 will result in an overall reduction in campsites of less than 1 %.

Comment: Please DO NOT change the use to create a self- fulfilling outcome that makes Turn Island ultimately off limits.

Service Response: The changes proposed in chapter 2, goal 6, including all of the strategies in the preferred alternative, are intended to support wildlife and their habitat while providing visitors the opportunity to experience and learn about the Refuge's wildlife resources. The Service is not proposing to make Turn Island "off limits" to visitation for the purposes of wildlife dependant recreation and education.

Appendix M. Abbreviations and Glossary

M.1 Abbreviations

ARPA Archaeological Resources Protection Act
ATBA Area to be avoided
BBS Breeding bird survey
BCC Birds of Conservation Concern
BIDEH Biological Integrity, Diversity and Environmental Health
BLM Bureau of Land Management
BLOY Black oystercatcher
BRCO Brandt's cormorant
CASE Calif ornia sea lion
CBC Christm as Bird Count
CCP Com prehensive Conservation Plan
CEQ Council of Environmental Quality
CFR Code of Federal Regulations
C-MAN Coastal-Marine Automated Network
COMU Common murre
Complex Washington Maritime National Wildlife Refuge Complex
CR Cultura l resource
DAHP Department of Archaeology and Historic Preservation
DCCO Double-crested cormorant
DDE Dichlorod iphenyldichloroethylene
DDT Dichlorodiphenyltrichloroethane
DO Dissolved oxygen
DOD Department of Defense
EA Environmental Assessment
Ecology Washington State Department of Ecology
EE Environmental education
ELSE Elephant seal
ENSO El Niño – Southern Oscillation
EO Executive Order
EPA U.S. Environmental Protection Agency
ESA Endangered Species Act
FAA Federal Aviation Administration
FIFRA Federal Insecticide, Fungicide, and Rodenticide Act
FR Federal Register
FTE Full-time employee
GB/PS Georgia Basin/Puget Sound
GIS Geographic information system
GPS Global positioning system
GWGU Glaucous-winged gull
HASE Harbor seal
IAC Interagency Committee for Outdoor Recreation

Improvement Act	National Wildlife Refuge System Improvement Act of 1997
IPCC	Intergovernmental Panel on Climate Change
IPM	Integrated pest management
IOSA	Island Oil Spill Association
MAMU	Marbled murrelet
MESA	Marine Ecosystem Analysis
MHHW	Mean higher high water
MLLW	Mean lower low water
MMPA	Marine Mammal Protection Act
MSL	Mean sea level
MOU	Memorandum of Understanding
MRA	Minimum Requirement Analysis
NADB	National Archaeological Database
NAGPRA	Native American Graves Protection and Repatriation Act
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NOAA	National Oceanic and Atmospheric Administration (also NOAA Fisheries)
NPS	National Park Service
NRHP	National Register of Historic Places
NSRE	National Survey on Recreation and the Environment (Pacific Region)
NWR	National Wildlife Refuge
NWRS	National Wildlife Refuge System
OMB	Office of Management and Budget
OSU	Oregon State University
PAH	Polycyclic aromatic hydrocarbons
PBDE	Polybrominated diphenyl ether
PBT	Persistent bioaccumulative toxic
PCB	Polychlorinated biphenyl
PECO	Pelagic cormorant
PI	Protection Island
PIGU	Pigeon guillemot
PL	Public Law
PLO	Public Land Order
PRPA	Paleontological Resources Preservation Act
PSAT	Puget Sound Action Team
PSAMP	Puget Sound Ambient Monitoring Program
PUP	Pesticide Use Proposal
RCO	Recreation and Conservation Committee (Washington State)
RCW	Revised Code of Washington
RHAU	Rhinoceros auklet
RONS	Refuge Operational Needs System
SCORP	State Comprehensive Outdoor Recreation Planning
Service	U.S. Fish and Wildlife Service (also, FWS)
SHPO	State Historic Preservation Office

SJI	San Juan Islands
SJIVB	San Juan Islands Visitors Bureau
STSE	Steller (northern) sea lion
SUP	Special use permit
TNC	The Nature Conservancy
TUPU	Tufted puffin
USC	United States Code
USCG	U.S. Coast Guard
USC&GS	U.S. Coast and Geodetic Survey
USCS	U.S. Coast Survey
USDA	United States Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
UW	University of Washington
UWCIG	University of Washington Climate Impacts Group
VS	Visit Seattle
WAC	Washington Administrative Code
WDOE	Washington Department of Ecology
WDFW	Washington Department of Fish and Wildlife
WDNR	Washington Department of Natural Resources
WRCC	Western Regional Climate Center
WSDOT	Washington State Department of Transportation
WSP	Wilderness Stewardship Plan
WSPRC	Washington State Parks and Recreation Commission
WWTA	Washington Water Trails Association
WWU	Western Washington University
YHONA	Yaquina Head Outstanding Natural Area

M.2 Glossary

Adaptive Management. Refers to a process in which policy decisions are implemented within a framework of scientifically driven experiments to test predictions and assumptions inherent in a management plan. Analysis of results help managers determine whether current management should continue as is or whether it should be modified to achieve desired conditions.

Alcid. A family of seabirds that includes tufted puffin, rhinoceros auklet, Cassin's auklet, common murre, ancient and marbled murrelet, and pigeon guillemot. They are colonial nesters, fish eaters, long-lived, and have low reproductive output.

Alternative. 1. A reasonable way to fix the identified problem or satisfy the stated need (40 CFR 1500.2). 2. Alternatives are different means of accomplishing refuge purposes and goals and contributing to the System mission (Service Manual 602 FW 1.6).

Anadromous. A fish that hatches in freshwater, migrates to the ocean to live and grow, and returns to freshwater to spawn.

Ballast Water. Water added to the ballast tanks of cargo vessels when empty to increase propeller immersion, to improve steering, and to control trim and draft.

Bedland. Aquatic lands that are submerged at all times, including all navigable salt and fresh waters.

BIDEH. Biological integrity, diversity and environmental health represented by native fish, wildlife, plants and their habitats as well as those ecological processes that support them.

Bioaccumulative toxin. Contaminants, such as heavy metals, that are accumulated in the tissue of organisms that live or forage in the environment.

Biological Diversity. The variety of life and its processes, including the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur (Service Manual 052 FW 1.12B). The System's focus is on indigenous species, biotic communities, and ecological processes. Also referred to as Biodiversity.

Bycatch. Marine organisms that are incidentally caught, along with the target fish species, by commercial and recreational fishing operations. Common bycatch species include seabirds, marine mammals, and fish species.

Carrying Capacity. The maximum population of a species a habitat or area can support.

Compatible Use. A proposed or existing wildlife-dependent recreational use or any other use of a national wildlife refuge that, based on sound professional judgment, will not materially interfere with or detract from the fulfillment of the National Wildlife Refuge System mission or the purposes of the national wildlife refuge (Service Manual 603 FW 2.6). A compatibility determination supports the selection of compatible uses and identifies stipulations or limits necessary to ensure compatibility.

Comprehensive Conservation Plan (CCP). A document that describes the desired future conditions of a refuge or planning unit and provides long-range guidance and management

direction to achieve the purposes of the refuge; helps fulfill the mission of the Refuge System; maintains and, where appropriate, restores the ecological integrity of each refuge and the Refuge System; helps achieve the goals of the National Wilderness Preservation System; and meets other mandates. (Service Manual 602 FW 1.6).

Concern. See definition of issue.

Cover Type. The type of vegetation in an area. Often referred to as percent cover or the % of ground covered by vegetation type (e.g., 20% shrub cover).

Cultural Resources. The remains of sites, structures, or objects used by people in the past.

Cultural Resource Inventory. A professionally conducted study designed to locate and evaluate evidence of cultural resources present within a defined geographic area. Inventories may involve various levels, including a background literature search, a comprehensive field examination to identify all exposed physical manifestations of cultural resources, or a sample inventory to project site distribution and density over a larger area. Evaluation of identified cultural resources to determine eligibility for the National Register follows the criteria found in 36 CFR 60.4 (Service Manual 614 FW 1.7).

Demography. The study of life-history parameters such as adult survival, fledgling success, number of broods raised per year.

Disturbance. Significant alteration of wildlife behavior or habitat structure and composition. May be natural (e.g., fire) or human-caused events (e.g., aircraft over flight).

Ecosystem. A dynamic and interrelating complex of plant and animal communities and their associated non-living environment.

Ecosystem Management. Management of natural resources using system-wide concepts to ensure that all plants and animals in ecosystems are maintained at viable levels in native habitats and basic ecosystem processes are perpetuated indefinitely.

Endangered Species (Federal). A plant or animal species listed under the Endangered Species Act that is in danger of extinction throughout all or a significant portion of its range.

Endangered Species (State). A plant or animal species in danger of becoming extinct or extirpated in Washington within the near future if factors contributing to its decline continue. Populations of these species are at critically low levels or their habitats have been degraded or depleted to a significant degree.

Environmental Assessment (EA). A concise public document, prepared in compliance with the National Environmental Policy Act, that briefly discusses the purpose and need for an action, alternatives to such action, and provides sufficient evidence and analysis of impacts to determine whether to prepare an environmental impact statement or finding of no significant impact (40 CFR 1508.9).

Finding of No Significant Impact (FONSI). A document prepared in compliance with the National Environmental Policy Act, supported by an environmental assessment, that briefly presents why a federal action will have no significant effect on the human environment and for which an environmental impact statement, therefore, will not be prepared (40 CFR 1508.13).

Fire Regime. A natural fire regime is a general classification of the role fire would play across a landscape in the absence of modern human mechanical intervention, but including the influence of aboriginal burning.

Focal Resources. Plant and animal species that are most representative of refuge purposes, BIDEH and other FWS and ecosystem priorities. Conservation and management of these species will guide refuge management in the future. See Priority Resources of Concern and Other Benefiting Species.

Forb. A broad-leaved, herbaceous plant; for example, a columbine.

Gillnet. A fishing net stretched between a weighted leadline on the bottom and a floatline on the top to support it vertically in the water column. A pelagic drift gillnet may be attached to free floating buoys at one end and a vessel at the other end. The species of fish targeted determines the size of the mesh in a gillnet. The fish can get its head through the net, but when it tries to back out, the fish is caught on the net by its gills.

Goal. A descriptive, open-ended, and often broad statement of desired future conditions that conveys a purpose, but does not define measurable units (Service Manual 602 FW 1.6).

Habitat. Suite of existing environmental conditions required by an organism for survival and reproduction. The place where an organism typically lives.

Habitat Type. See Vegetation Type.

Habitat Restoration. Management emphasis designed to move ecosystems to desired conditions and processes, and/or to healthy ecosystems.

Invasive Species. A non-native species whose introduction causes or is likely to cause economic or environmental harm. Also referred to as exotic or non-native species.

Inventory. A survey that documents the presence, relative abundance, status and/or distribution of abiotic resources, species, habitats, or ecological communities at a particular time. Often referred to as baseline inventory.

Issue. Any unsettled matter that requires a management decision (e.g., a Service initiative, opportunity, resource management problem, a threat to the resources of the unit, conflict in uses, public concern, or the presence of an undesirable resource condition) (Service Manual 602 FW 1.6).

Lacustrine. Relating to a lake.

Kleptoparasitism. A form of feeding in which one animal takes prey from the animal that caught or collected it.

Management Alternative. See Alternative.

Migration. The seasonal movement from one area to another and back.

Mission Statement. Succinct statement of a unit's purpose and reason for being.

Monitoring. A survey repeated through time to determine changes in the status and/or demographics of abiotic resources, wildlife or plants, habitat, or ecological communities.

National Environmental Policy Act of 1969 (NEPA). Requires all agencies, including the Service, to examine the environmental impacts of their actions, incorporate environmental information, and use public participation in the planning and implementation of all actions. Federal agencies must integrate NEPA with other planning requirements, and prepare appropriate NEPA documents to facilitate better environmental decision making (40 CFR 1500).

National Wildlife Refuge. A designated area of land, water, or an interest in land or water within the National Wildlife Refuge System.

National Wildlife Refuge System. All lands, waters and interests therein administered by the Service as wildlife refuges, wildlife ranges, wildlife management areas, waterfowl production areas, and other areas for the protection and conservation of fish and wildlife, including those that are threatened with extinction.

National Wildlife Refuge System Mission. The mission is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Native Species. Species that normally live and thrive in a particular ecosystem.

Noxious species. Any plant or plant product that can directly or indirectly injure or cause damage to crops (including nursery stock or plant products), livestock, poultry, or other interests of agriculture, irrigation, navigation, the natural resources of the United States, the public health, or the environment. Control of these species is mandated by law.

Objective. An objective is a concise target statement of what will be achieved, how much will be achieved, when and where it will be achieved, and who is responsible for the work. Objectives are derived from goals and provide the basis for determining management strategies. Objectives should be attainable and time-specific and should be stated quantitatively to the extent possible. If objectives cannot be stated quantitatively, they may be stated qualitatively (Service Manual 602 FW 1.6).

Obligate Species. Species that require a specific habitat type or plant species for their existence.

Ocean Acidification. The ongoing decrease in the pH of the Earth's oceans, caused by their uptake of anthropogenic carbon dioxide from the atmosphere.

Other Benefiting Species. Native species, other than priority resources of concern and focal resources, that will benefit from management actions.

Paleontology. The study of prehistoric life, including organisms' evolution and interactions with each other and their environments.

Passerine. See songbird.

Pinniped. A suborder of carnivores that are marine mammals, have flippers, and eat mostly fish and marine invertebrates (e.g., sea lions, seals).

Plant Association. A classification of plant communities based on the similarity in dominants of all layers of vascular species in a climax community.

Plant Community. An assemblage of plant species unique in its composition; occurs in particular locations under particular influences; a reflection or integration of the environmental influences on the site such as soils, temperature, elevation, solar radiation, slope, aspect, and rainfall; denotes a general kind of climax plant community (e.g., Sitka spruce).

Preferred Alternative. This is the alternative determined (by the decision maker) to best achieve a refuge's purpose(s), vision, and goals; contribute to the Refuge System mission; address the significant issues; and is consistent with principles of sound fish and wildlife management.

Priority Resources of Concern. Habitats that are most representative of refuge BIDEH, as well as other Service and ecosystem priorities that were chosen as resources that will guide refuge management in the future. See Focal Resources.

Priority Species. Fish and wildlife species that the Washington Department of Fish and Wildlife believe require protective measures and/or management guidelines to ensure their perpetuation. Priority species include the following: (1) state listed and candidate species; (2) species or groups of animals susceptible to significant population declines within a specific area or statewide by virtue of their inclination to aggregate (e.g., seabird colonies); and (3) species of recreational, commercial, and/or Tribal importance.

Public. Individuals, organizations, and groups; officials of Federal, state, and local government agencies; Indian tribes; and foreign nations. It may include anyone outside the core planning team. It includes those who may or may not have indicated an interest in Service issues and those who do or do not realize that Service decisions may affect them.

Puget Sound. Estuarine system of interconnected marine waterways and basins extending from Deception Pass and Admiralty Inlet in the North to Olympia, Washington, in the south and Hood Canal to the west.

Purpose(s) of the Refuge. The purpose of a refuge is specified in or derived from the law, proclamation, executive order, agreement, public land order, donation document, or administrative memorandum establishing, authorizing, or expanding a refuge, refuge unit, or refuge subunit (Service Manual 602 FW 1.6).

Refuge Goal. See Goal.

Refuge Purposes. See Purposes of the Refuge.

Salish Sea. A single estuarine ecosystem that extends from the north end of the Strait of Georgia to the west end of the Strait of Juan de Fuca and south to the southern extent of Puget Sound. It encompasses the inland marine waters of Southern British Columbia, Canada, and northern Washington, USA (WWU 2009).

San Juan Archipelago. The San Juan Archipelago is split into two groups of islands based on national sovereignty. The San Juan Islands are part of the U.S. state of Washington within San Juan, Whatcom, and Skagit counties. The Gulf Islands are part of the Canadian province of British Columbia. There are over 450 rocks (with minimal vegetation) and islands (with

vegetation) in the entire archipelago at high tide. Within this document, we refer to the U.S. portion of the archipelago when using this term.

Seabird. A group of birds that obtain at least some food from the ocean by traveling some distance over its surface. They also typically breed on islands and along coastal areas. Seabirds include gulls, alcids, penguins, albatrosses, storm-petrels, and cormorants, among others.

Songbirds. (Also Passerines) A category of birds that are medium to small, perching, land birds. Most are territorial singers and migratory.

Step-down Management Plans. Step-down management plans provide the details necessary to implement management strategies identified in the Comprehensive Conservation Plan (Service Manual 602 FW 1.6).

Strategy. A specific action, tool, or technique or combination of actions, tools, and techniques used to meet unit objectives (Service Manual 602 FW 1.6).

Succession. The observed process of change in the species structure of an ecological community over time.

T-sheet. A historic type of topographic map produced by the U.S. Coast and Geodetic Survey.

Threatened Species (Federal). Species listed under the Endangered Species Act that are likely to become endangered within the foreseeable future throughout all or a significant portion of their range.

Threatened Species (State). A plant or animal species likely to become endangered in Washington within the near future if factors contributing to population decline or habitat degradation or loss continue.

Tidelands. Submerged lands and beaches that are located between ordinary high tide and extreme low tide.

U.S. Fish and Wildlife Service Mission. The mission of the U.S. Fish and Wildlife Service is working with others to conserve, protect, and enhance fish and wildlife and their habitats for the continuing benefit of the American people.

Vegetation Type, Habitat Type, Forest Cover Type. A land classification system based upon the concept of distinct plant associations.

Vision Statement. A concise statement of the desired future condition of the planning unit, based primarily upon the System mission, specific refuge purposes, and other relevant mandates (Service Manual 602 FW 1.6).

Wilderness. "…an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvement or human habitation..." (Wilderness Act 1964)

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National Wildlife Refuge System Information
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The mission of the U.S. Fish & Wildlife Service is working with others to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people.

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